

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Vol. VI No. 25

NEWSPAPER

Systems/Peripherals 10

The figures are contained in a new report entitled "Profile of a Systems
pany data questionnaire.
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More DP Needed to Deter Crime

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port submitted by Jackson.
Prof. James Vorenberg, former executive director of the Forensic Commission on Law Enforcement and the Administration of Justice, concluded that the court system "appears to have deteriorated" in the past five years, Jackson commented.

Jackson introduced an article from the May issue of *Atlantic*, in which Vorenberg said much federal aid "has gone for such flashy items as helicopters, computerized identification systems, and new weaponry. Yet these have not produced a significant impact on crime."

Proposals to substitute family houses for high-security prisons, and computers for court docket clerks, "threaten job security and challenge the propriety and worth of what is being done," Vorenberg contended.

"Much of the answer lies in the inevitable possibility to change in any large

bureaucracy," he said.

The article was also critical of the "black grant" system of federal aid, claiming "with black grants the federal government cannot directly push for reform."

"It simply gives a lump sum to each state to be distributed in accordance with the state's own written plan."

The Law Enforcement Assistance Administration (LEAA) is one federal agency which provides such block grants to help fight crime, and one recipient has been Project Search, which conducts research into computerized criminal systems.

New Use for 'Search' Report?

Project Search officials have recently compiled guidelines for states to use in setting up these retrieval systems, with the goals of providing for speedy trials and protecting privacy.

These guidelines may be of special assistance to states under Jackson's bill, since states and local governments "would not be eligible for LEAA grants unless they had a 'prompt trial plan approved by the LEAA.'"

"Continuing eligibility would depend on progress toward the prompt trial objective."

The typical unit was a small one. Over one-fourth of the responding companies had fewer than 10 people in the systems and DP unit, and two-thirds of the companies had fewer than 50 people there.

DP Budgets

Even so, about one fifth of the respondents showed an equipment budget of "over \$75,000" — the highest range listed in the questionnaire, while other respondents checked lower categories up to \$50,000 were about evenly distributed.

What may appear to be a disparity appears in the figures for the average age of respondents, which is getting lower. For example, there is more than a 50% increase in respondents under 29, from 14% two years ago to 22% in the current study.

While respondents aged 30 to 39 are down just slightly, those aged 40 to 49 and 50 to 59 are both down significantly. According to ASM, this suggests that organizations "may have recognized the system generally integrates talents as being of greater value higher up the organizational structure."

Today's systems managers, the report claimed, are "candidates for executive positions" because of their training and

Justice's Computers Inadequate?

WASHINGTON, D.C. — The inability of a Department of Justice information system to provide data on the enforcement of laws has come under attack by Senate Majority Leader Mike Mansfield.

Senator Mansfield successfully proposed mandatory sentencing for convictions of "mere possession of a weapon" in committing a crime.

"Out of a congressional responsibility to review all laws," he attempted last March to "determine how the tool provided by this proposal was working in the fight against crime and violence."

Mansfield sent then Acting Attorney General Richard G. Kleindienst a request for data on "the courts' compliance with these sentencing procedures, including the number of first and subsequent offenders sentenced thereunder, terms of sentences, crimes involved," and other information.

Assistant Attorney General Henry E. Petersen responded that the "statistical data you requested could not be retrieved."

"We are informed, however, that the Department of Justice information system is under alteration and that information such as you requested will be available" when the modifications have been completed," Petersen promised.

Addressing his Senate colleagues recently, Mansfield said, "In this era of sophisticated computer systems, it is inconceivable that crime, criminal penalties, criminal justice, and all such related matters cannot be adequately monitored."

While the crime rate "continues to soar," Mansfield continued, "the U.S. Senate is unable to be informed adequately" about "fundamental information concerning the enforcement of 2-year-old laws — designed expressly to curtail that rate of crime."

The bill, an amendment to the Omnibus Crime Control and Safe Streets Act of 1968, would authorize \$750 million over the next three years, for grants for criminal justice reform.

"I am convinced that we must commit new federal resources if we are to make

real progress toward rehabilitating our criminal courts," Jackson said.

The bill was referred to the Committee on the Judiciary for investigation and recommendations, and a spokesman for Jackson said there was "no way" to know when a report might be forthcoming.

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Systems Jobs Salaries Not Climbing as Fast

(Continued from Page 1)

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According to ASM, this suggests that organizations "may have recognized the system generally integrates talents as being of greater value higher up the organizational structure."

Today's systems managers, the report claimed, are "candidates for executive positions" because of their training and

skills bring a most needed quality to the executive ranks.

"Future executive candidates will be

trained in systems principles and concepts to become generalists in management systems," the report said.

Gal Engineers Set Computer Meet

CAMBRIDGE, Mass. — Are they for us or against? Are they a tremendous boon to mankind or are they monsters insidiously encroaching into every nook and cranny of our day-to-day life?

Computers are here to stay and the questions will be explored in the technical sessions of the Society of Women Engineers' 22nd national convention being held at the Sheraton Commander June 22-25.

The theme, "The Impact of the Computer on the Society of Today," sets the scope of the exploration and the most important phase of the impact is pointed up by the keynote speech, "The Challenge of the Computers" to be given by Commander Grace Hopper, USNR, Head, Navy Program Languages.

Sessions will include: "Computer Design and the Challenge to Engineering," "The Computer Industry of the Future," and presentations of papers on the impact of computers on the insurance business, banks, merchandise warehousing, libraries, hospitals, industry, air traffic control and lotteries.

Mrs. Margaret Linda, 301 Park St., West Roxbury, Mass. is the convention registrar.

Study on Use of Computers in Blood Banks Available

BETHESDA, Md. — The National Blood Resource Program has released a synopsis of the results of four studies on the operation of computer systems to blood banking processes.

These studies were carried out in New York, Chicago, Buffalo and Milwaukee with the support of the National Heart and Lung Institute.

They include:

- A critique of blood bank services which can be managed by computer
- General suggestions of proper hardware and estimates of cost-effectiveness
- Guidelines to use in evaluating your blood bank for computer services.

For your copy, write to: James M. Stengle, M.D., Chief, National Blood Resource Program, NIH, Bethesda, Maryland, 20014, Attn: Feasibility Study.

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User Association Hits Problems

OCR Use Requires 'Concentrated, Constructive Effort'

By E. Drake Lundell Jr.
Of the CW Staff

PARK CITY, Utah—Optical character recognition is a viable and useful tool for data entry, but ways must be found to extend its usefulness to a wider audience. That is the consensus of a recent OCR User's Association meeting which was attended by almost 100 OCR users and equipment manufacturers here recently. The meeting was also the scene of an exchange of views on the problems that plague current OCR installations, with discussions covering reject handling, reading carbon forms, etc.

"The optical scanner can function in an uncontrolled environment, with a high degree of accuracy," Roy Rapp of the Social Security Administration told the group, but it requires "concentrated and constructive effort."

"Future applications of the device," he added, "are unlimited. Its use will become more universal as the most common problems are overcome and technical advances made which, not only improve its present reading capabilities, but also create a flexibility undreamed of in our present environment."

One major problem with accepting documents either typed or handwritten from an uncontrolled environment, today, Rapp said, is that the people preparing the documents are often untrained for the work.

To alleviate this problem and to spread the use of OCR into more areas, he suggested that training programs should be initiated in the high schools and commercial schools.

"Present typing text books contain instructions for typing letters, memorandums, manuscripts, tabulated data and statistical tables. Instructions for preparing scannable forms could be incorporated in these text books and would be very helpful to all OCR users," he asserted.

In addition, he asked: "What better approach could we use than to teach OCR-A, handprint format in the lower grades?"

"This," he stated, "could eventually become the universal handprint style. Such an educational system would be instrumental in opening the door for many more applications of scanning, and would permit a faster response to many mail orders and other miscellaneous matters."

Problems Discussed

Documents rejected for errors and how to recapture the data was the major topic at a forum in which users discussed problem areas and received help both from other users who had overcome similar problems and from manufacturers representatives who had experience with similar matters.

The users used almost every method imaginable to recapture data lost because a document was rejected, ranging from keypunches through key-to-disk systems to direct on-line entry with no one technique apparently having the upper hand.

However, the problems of correcting documents has to be handled carefully, the users agreed.

In some cases, one said, user departments don't like to have the errors corrected in the computer room, because the computer room personnel, unfamiliar with the original situation, might make a more serious mistake than the one they were trying to correct.

In cases like this, they agreed, it is best to send the rejected documents back to the originating department for all corrections.

It is not only important to train the people who will be preparing documents for later OCR input carefully, one user said, but it is also important to keep monitoring their performance to make sure they perform at the maximum efficiency.

To do this, he said his installation kept a

record of all rejected documents by user department so that they could send performance reports to those departments on a regular basis. When the performance was starting to slip, the user department would be responsible for finding the cause—either in its machinery or personnel—and correcting it.

He noted that the firm had tried an experiment by not sending out the periodic reports and "the error rate shot up dramatically."

Another user agreed, noting that his organization had been able to get "a 10-fold increase in quality" after it initiated a program to provide continual feedback to the inputter and continually monitor the quality of the forms coming in for scanning.

Hardware Controls

In the area of hardware performance controls, the group agreed it is necessary to keep careful internal track of main-

tenance records in order to find any degradations in the performance of the systems.

In order to discover any degradation, one user suggested running a test deck before each shift the OCR equipment was placed in operation. If there is any increase in the error rate from one shift to the next or one day to the next, then it is easy to tell there is some problem with the equipment, he suggested.

Ralph Brouwer, executive secretary for the association, noted that he reports to the customer engineer servicing the equipment on a daily basis on possible problem areas found by an analysis of every reject found in the operation of the system.

Another user, however, suggested that OCR users need not analyze every rejected document to find problems in both personnel or equipment.

"The OCR user," he said, "should set acceptable parameters for rejected documents. If the reject rate runs over that

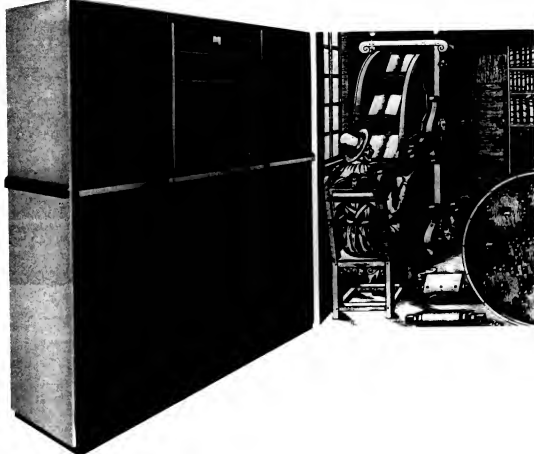
level, he added, "then the user can analyze the data for the source of the problem."

It is almost impossible to pool a number of small jobs into one OCR run, the users agreed, because of difficulties in developing software to handle the number of small applications.

In another area, several users warned that the OCR-A font on the Selectric typewriter from IBM differed "significantly" from the OCR-A font on the 1403 print train and that the two couldn't be intermixed when using a single font reader.

The B, D, one, 1, 8, 0 and zero are different and could cause problems one user asserted. However, another user reported that it was possible to get a Selectric ball with a font that matched that of the 1403 print train, but that it had to be specially ordered and many IBM salesmen were not familiar with it.

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DP Study May Nix Diet Drugs

WASHINGTON, D.C.—The Food and Drug Administration is currently evaluating results of a computer study on the use of amphetamines and other anti-obesity drugs for weight reduction.

The \$40,000 pilot project was undertaken to determine "once and for all whether these drugs are safe and effective" in light of their widespread abuse.

"It will provide the most important facts," said an attorney for the Bureau of Narcotics and Dangerous Drugs who will use the results of the study to set amphetamine production quotas for next year.

The computer scanned 70,000 punched cards with information about 1,200 patients from 20 different studies in an effort to determine such factors as weight loss attributed to drugs, how close it was to target, how long the pounds stayed off and the number of dropouts.

Dr. Barrett Scoville, deputy director of the Food and Drug Administration's Division of Neuropharmacological Drug Products said the computer was the "only feasible way of setting policy in a broad fashion implicitly rather than one drug at a time."

The results of the study and the government's decision regarding drug production are expected to be complete in early July.

Time Runs Out on British Data Bank Bill

LONDON—A bill that would set up a tribunal to regulate the operation of data banks in Britain was essentially killed during a recent debate in the Commons. The provisions of the bill were still being discussed when the statutory time limit was reached and now there appears no chance of the bill becoming law during this session of parliament.

Leslie Huckfield, the bill's sponsor, urged the government to accept his proposals, claiming that

taking any steps to safeguard information in data banks.

Welfare Recipients Receive \$80,000 in Duplicate Checks

DETROIT—A computer in the state's Department of Social Services recently sent out \$80,000 in duplicate checks to welfare clients throughout the state.

According to Gerold Brockmyre, assistant deputy director of the state agency, the duplicate checks resulted when the same batch of supplemental emergency payments was fed into the computer on two separate days. The error was discovered when merchants who were asked to cash two checks grew suspicious.

Many of the 887 twice-paid recipients are cashing the second check under the mistaken impression that they are entitled to the money, but some clients "are sending the extra checks back," said Brockmyre.

Those who have spent the money have received a rather strong letter suggesting they make an arrangement to repay the money," he added.

Bankettes Provide 24-hour Automated Banking Service

MONTREAL—A 24-hour computerized banking service that can handle about 98% of ordinary transactions carried out by an individual is being planned by the Royal Bank of Canada.

The "Bankettes" will be installed in 14 locations in metropolitan Toronto and may be expanded to other locations. The units will take deposits, transfer money from one account to another, pay bills and dispense cash to the customer.

Royal is expected to be the first Canadian bank to provide complete 24-hour service.

Sewer Overflow Controlled

CLEVELAND, Ohio—Overflow waste water in the city's sewer system will soon be controlled by a computer. An effort to reduce pollution of Lake Erie and local streams.

Overflows of storm water and raw sewage occur during wet weather when the volume of waste water becomes too large for the system to handle. With the new system, gauges will measure the water level in the sewers and the rainfall outside.

This information will go to a central computer via telephone lines. If it is determined that the flow is too heavy, "minidams" in the sewers will automatically be inflated to temporarily store the extra waste water.

In addition to controlling sewerage flow, the system will be used to test out—via simulation techniques—other pollution control ideas.

Oil Spillage Minimized

ANCHORAGE, Alaska—A \$20 million microwave communications system has been designed to minimize oil spillage along the 789-mile route of the proposed trans-Alaska pipeline.

The computerized monitoring system would update pipeline conditions every 10 seconds, alert central control to any unusual changes and pinpoint the exact location of the potential trouble spot.

As an added precaution, if the computer detects problems in the two critical junctures of the pipeline, all 12 pipelines can be shut down.

Real Estate Goes Modern

HAWKNEE HILLS, N.H.—For sale: one modern ranch house with three bedrooms, formal dining room—plus a computer terminal.

Derrick Johnston, a GE employee, is selling his home here and the buyer, *Yankee Magazine*, insisted that the terminal, presently installed in the Johnston home, be included with the house. The magazine, publisher of the *Old Farmer's Almanac*, plans to use the terminal, now tied to the Dartmouth Time Sharing System, for aid in weather prediction.

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By Harry L. Anderson

Special to Computerworld

MILWAUKEE, Wis. — Thirteen Wisconsin hospitals, operating a shared computer center with the Wisconsin Blue Cross Plan, are getting advanced hospital information processing at a fraction of what it would cost them to install their own systems.

Remote terminals, on line to an IBM 370/155 transmit patient information, data and service charges to the center which, in turn, provides a wide variety of hospital accounting services. Through the terminals, each hospital can inquire into specific patient records, and receive a response within seconds.

An advisory council, made up of the administrator of each member hospital, establishes policy and guides the operations of the center. Key to the system, which runs under the IBM's Shared Hospital Accounting System (SHAS), is a series of five comprehensive master files set up in advance for each hospital. These include:

- A "hospital profile," containing some 3,000 pieces of data to delineate the hospital's particular requirements and mode of operation. The data here includes patient and medical service classifications, details of accounting procedures and report formats, billing cycles and final bill hold interval—in short, all of the guidance information the computer needs to tailor its processing to hospital specifications.
- A charge description master file, identifying every charge within the hospital and the pricing to be applied to each.
- A room and bed master file, detailing each room and each bed within the room.
- A doctor's master file, listing all physicians and surgeons on the hospital staff, along with their fields of specialization.
- An approved medical insurance file, containing coded details for up to 3,600 different medical insurance programs.

Automated Accounting

Each hospital pays an established fee per patient-day to the center. In return, it receives virtually total automation of all patient-related accounting records, from admission to discharge and settlement of the bill. This includes automatic preparation of the bill itself, with detailed insurance apportionments and full Medicare documentation.

Patient billing is the key application, both in eliminating a tremendous manual recordkeeping chore and as the basis for many administrative control reports. As each patient is admitted, the computer creates a new patient record on the master file and sets up the entries on the room and bed master.

Patient Charges Compiled

Once the patient is in the hospital and the necessary records established, per diem charges are automatically applied to the patient record until the hospital transmits notice of discharge. Service charges to the patient are recorded at the source (laboratory, X-ray, pharmacy, etc.) on a standard charge ticket.

The computer prices the charge item by referring to the master charge file, then posts the charge amount to the patient's record. At the same time, the computer adds the charge transaction to the cumulative record for service utilization statistics and adds the dollar amount of the charge to revenue statistics.

When the patient is discharged, the computer initiates the patient billing routine. First, the system automatically makes the necessary record changes to update the room and bed master file and it breaks out patient-day statistics. A fully detailed bill is printed out, ready for mailing to the patient.

Drawing from the comprehensive medical insurance plan master file, the system

makes all of the charge pro-rations and calculations and prints out any required commercial insurance bill, Blue Cross bill and Medicare bills.

Patient Census Reports

On a daily basis, working with patient admission, transfer and discharge transaction data transmitted from the hospital, the computer prepares both a trial and a final patient census. The standard final

Spotlight on Sharing

census report lists patients by nursing station in room and bed number order and includes the patient's age, sex, religion, doctor and medical program code. Some of the participating hospitals request census data in a pre-established form to serve as the basis for temperature charts, day reports, pharmacy charge re-

ports and Medicare reports.

Regardless of the particular census format a hospital requests, the full, daily patient census is transmitted from the computer and printed out at the hospital terminal in the early morning hours, before the start of the day's routine.

Special Reports

In addition to the census, the computer transmits daily reports to the hospital for many accounting and administrative control functions. These daily reports include: a balancing of charge items by patient; detailed admission statistics; a listing of patient transfers and discharges; a summary of patient-day statistics, of bed occupancy by private, semi-private and ward classifications and many other reports tailored to the hospital's requirements.

A hospital can use its terminal at any


time to retrieve current in-patient bill status, either in detail or in summary, and including insurance pro-rations.

Inquiry can be made on a patient's current accounts receivable status. In a matter of seconds after an inquiry has been keyed into the terminal, the computer prints out the desired information on the terminal typewriter.

The initial objective of the center was to create the data communications network linking member hospitals to the shared computer for hospital accounting and business office functions.

Now we are studying the feasibility of applying the combination of central computer and on-line terminal to areas of patient care as well. When this is accomplished, the benefits of shared data processing to member hospitals will be multiplied manifold.

H.L. Anderson is vice-president — data processing division of Associated Hospital Services, Inc.



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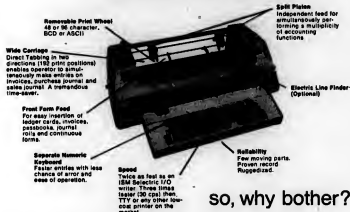
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Doctors Automate Old Technique To Find Foreign Particles in Eye

KANSAS CITY, Kan. — Two doctors here have developed a computer program to determine the exact location of a foreign object lodged in the eye.

Dr. Thomas J. Cusack, radiologist at Kansas University Medical Center, simply automated a technique developed by William Sweet in 1898. Sweet's method uses X-rays of the eye taken from several different angles. It requires sophisticated mathematics, geometry and graphing to locate the object in a patient's eye by triangulation.

The computer eliminates the cumbersome figuring previously

done by the radiologist. The result is faster, more accurate localization of the foreign body, according to Cusack.

Causes for which this method is used are rare and the radiologist gets out of practice.

The computer, however, "will not forget how to do it. The possibility of misinterpreting the instructions or drawing the lines wrong is eliminated," he added.

Cusack said the computer program is not difficult and can be used on almost any computer.

Cusack developed the program with Dr. William F. Herrin, a computer expert at the hospital.

Meat Packing Industry Modeled

TORONTO, Ont. — The meat packing industry can become more efficient through the use of operations research and computers, according to W.F. McLean of Canada Packers Ltd.

He told a recent conference of the Canadian Operational Research Society about a number of computer models his company has developed plus a new "national beef model" under development.

Some of the models designed to aid front-line managers in the meat packing industry are:

- Formulation and blending for use in certain meat products, feeds and shortenings
- Inventory control systems
- Short-term operating planning systems to help make pricing, sales and production decisions
- Forecasting systems for future livestock supplies

Additional systems include sales information, manufacturing yield control and livestock grading.

McLean noted these are relatively simple cost-saving applications and they "have only scratched the surface of the potentially profitable possibilities."

The "national beef model" program under development will encompass all Canada Packers' beef plants across Canada. The

model, consisting of 3,000 equations, will attempt to distribute beef as efficiently as possible, taking into account the various conditions of the industry, McLean added.

DP Checks Boll Weevil

AUBURN, Ala. — Alabama cotton scouts will have a new member of the team this year. A computer has joined the group in their fight against the boll weevil and other cotton insects.

"The computer will give the scouts a rapid analysis of the data each week, and will keep growers more up to date than ever before on the cotton insect situation over the state," said Dr. Roy Ledbetter, Auburn University Extension entomologist.

The computer will aid about 100 scouts who will check some 150,000 acres in the state this summer, he stated.

Old Buildings Catalogued

TORONTO, Ont. — Canada is planning to catalogue and classify 600,000 of the country's older buildings with the help of a computer. It is the first project of its kind, according to Labor Minister Martin O'Connor.

The information gathered by the survey will be made available to planners, architects, historians and government agencies.

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Mind Map Test Gives Better School Results

DETROIT, Mich. — Being able to walk along a straight line is part of the preadmission testing procedure at Oakland Community College (OCC) here. But as a student navigates the line, he encounters a barrier — a chair directly over the line.

How he solves the problem — whether he walks around the chair, kicks it, lifts it out of the way, crawls under it, climbs over it, sits on it, carries it with him or simply stops — is part of an unusual test series being employed to identify the student's learning style and approach to problem solving.

Test Forms Input

Currently, students entering OCC are observed during a three-hour test that not only measures such standard items as reading and mathematical ability, but also evaluates decision-making and such abstract ideas as "the sixth sense" (proprioception), staged behavior (histriionics), physical coordination (kinesethetics) and knowledge of oneself (synnoetics).

Observations and test results are then processed on the school's IBM 360/50, and correlated into a chart called a "cognitive style map," which depicts the student's characteristics and certain aptitudes.

The map is used by the student and his teachers to choose from a wide variety of study methods in courses ranging from social science to advanced chemistry.

Results of the two-year college show that student performance has improved from a national average of 50% success in course study to 87% success.

Primarily, the concept of "cognitive style mapping" using computer analysis here attempts to identify a person's style at a given point in time. However, a spokesman noted that styles do change based on a person's experiences at different levels of educational development.

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Editorial

Worthwhile Application?

Two weeks ago we printed the results of a very incomplete New Hampshire study that revealed new cars are involved in more accidents than older cars.

We thought the study was interesting, not because it proved anything, but because we thought it might encourage others to take a fresh look at the mountains of records piling up around them.

Records dating accumulating long before there were computers, and, too often we think, no one stops to consider that these records can now be used, with the help of a computer, to uncover trends.

Considering the awful carnage from auto accidents and the long-time assumption that most of them are caused by "driver error," we were more than startled when the National Safety Council told us that nothing like the New Hampshire study (inadequate as it was) had been undertaken before.



Where's 142-37-1668?

Letters to the Editor

Satellite Computers Modify Centralization

Your report of the disastrous experience of a top corporation which centralized its computers into a "serve center" [Viewpoint, CW, May 24], seemed to point out potential problems for California's DP master planners, who were reported in the same edition to be centralizing their computers.

The difference appeared to be the modification of California's centralized plan with liberal doses of Commander Grace Hopper's concept of "distributed computing." Small satellite computers are to be connected to the economy-of-scale data centers.

As a DP manager in a state going through similar consolidations, I share an interest in California's success or failure with other Michiganders, who may experience similar results tomorrow.

John W. Simons, Chief Data Processing Section Center for Health Statistics Department of Public Health Lansing, Mich.

A Different View Of DP Professionalism

I have been reading the Taylor report and viewpoint. I am not saying that they are wrong or right, but I would like to tell you about a group I belong to.

We have no regular meetings, we have no dues, we have no by-laws or standing committees. We have no dinners with speakers, no social nights, no tests, no jolly. If someone has a problem, we try to help him. Data processing problems are the only type of problems we work on, and all this is on our own time at our own expense.

We have a standing offer to try to help at no cost. We don't even have a name, but we do roll up our sleeves and get the work done. We feel this is what data processing professionals are all about.

Robert E. Sennet

Streamwood, Ill.

Computer School Defended

In the May 31 issue the first "Letter to the Editor" is from a disgruntled graduate (I assume he graduated) of a computer school in the midwest. There are several points I feel I should mention.

First, I think it might have been better if there had been a letter with the opposite point of view in order to provide a measure of balance.

Second the writer says all his classmates are doing things other than DP. If this is a fact, then we should know how large his class is and when it graduated. He is really condemning his classmates any way rather than the school, or else he is saying he is far and away better than they. If he got a position in DP, why can't they?

They "whisked him through" in order to take the classroom available for the next scheduled class. But scheduling is all important in any well-run business; so where is the evil in being business-like in a school?

He is in DP so I respectfully suggest he better learn the importance of scheduling or he won't be in DP very long. Incidentally, he admits the opportunity was presented to retake any portion if he didn't feel he had learned enough. What college will do the same under the same circumstances and not leave your record with an "F" grade?

Of course the material was (seemingly) outdated. Did he think he could really assimilate anything other than basics in the six months? He already cried about how much he had to learn in a very short time, so did he want a cram course in 10 hours in to make it tougher?

I would like to point out that a four-year degree course in college is composed entirely of outdated basic, some of them so much so that it is nearly criminal. The entire purpose of any course of education is to present the means of improving yourself, not to automatically do the improving.

To somewhat soften my indictment of the author of the letter, let me add that I am sure there are many schools unscrupulous in their advertising and misleading in their claims made to prospective students, and these are not to be tolerated when found. But a general indictment of all schools is unfounded.

How many college grads could say the same thing about their colleges; how many people could say the same about their automobiles, etc? Does the author really want to throw out the baby with the dirty bathwater?

D.T. Dahinden

Pasadena, Calif.

Thanks From a Programmer

After seeing *Computerworld* constantly chop up IBM and stomp on RCA's grave, not to mention how many times CW has put programmers down, I would like to thank you for writing a very interesting and informative article on "Value System Vital to Programmers" [CW, May 24].

Nick Galante
Programmer

Los Angeles, Calif.

Two Bases Give Two Results

The article "New Hampshire Asks Newer Cars More Risky" [CW, June 12] talks of a computer-aided study which again proves that "computer" is a badly overworked word. Cars, computers and motor vehicle bureaus have one thing in common. Their conclusions are about as safe as their programmers.

Of 26,026 New Hampshire accidents happening in '71 and involving 1955-71 cars, about 24% involved '71 models, and 17% '70 models. Many of them are mortally wounded, so they are removed from further statistics. Many of them rack up a great yearly mileage, being owned by salesmen, or Herts or Avis.

Ten percent of '71 New Hampshire accidents involved '69 cars and 7% involved '68 models. But a sensible person who drives only for an occasional trip to the store, or a short way just to work and back each day, is quite apt to be the operator of a two or three year old car.

Ten percent of the listed accidents implicated '67 models, 14% were '66 models and 17% were '65s. But it is these five or six year old cars which are driven by our flaming youth, or else by older people who just don't give a darn.

Accidents per occupant mile have often been used to prove that auto travel is more dangerous than air travel. Why should New Hampshire and the National Safety Council switch to accidents per vehicle year to prove new cars are dangerous? If you switch to two bases, you change the two results.

Richard MacCutcheon
Cleveland, Ohio.

Study Raises Questions

After reading the article "Newer Cars More Risky" many more questions come to mind. Did the New Hampshire Motor Vehicle Division really believe the cited statistics say anything about the headline question? *Computerworld* must be so committed, heartfully, for such a glorious put-on article.

Are the officials at the National Safety Council as obsessed with statistics as the article makes so obvious?

The CW staff writer and "the officials" mentioned share the dubious honor of making the later year models totally responsible for accidents; e.g., "The 1971 model cars accounted for... accidents, which killed... people... At the same time, 1968 model cars were involved in only..." Strange how the '71s are pronounced accountable while the '68s were merely involved.

Historians will be quite amazed how progressive (?) New Hampshire must have been back in the late '60s and early '70s. Is it any wonder the National Safety Council wanted studies made on the driverless autos of New Hampshire paining accident proficiency each year. Praise, too, must be bestowed upon the "computer" for its aid in the study.

Beware, the computer will be next. Watch Ralph and Co. prove the case — and with statistics yet.

H.J. Bott

Galveston, Texas

We agree the statistics raised more questions than they answered. Further massaging of the data might reveal why late model cars are involved in more accidents. We believe such computer applications should be encouraged, not ridiculed.

Stock Chart Not Aligned

After seeing article after article by Alan Taylor on computer generated reports, I cannot understand how *Computerworld* could take Trade-Quoter Stock Trading Summary without first checking its content. A single scan would reveal that a stock that did not have a fraction was not properly column aligned.

How this format was ever acceptable is beyond my comprehension; first to be released by Trade-Quoter and then printed by *Computerworld*?

Lewis Berlent
Storck, Cataldo, Carroll & Associates, Inc.
New York, N.Y.

The summary is printed out on a terminal at SAC's printing plant just before deadline and directly reproduced. The format problem, which developed with the May 3 issue, went unnoticed until after Spring Joint. It has now been corrected. Ed.

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

Full Suit of Standards Needed, Besides Sporadic Ones

At the June Society of Certified Data Processors Boston Chapter meeting, we discussed what standards were needed to ensure proper handling of data processing. That's right—ensure proper handling—not just encourage it. We also discussed how one could tell a good standard from a bad one and whether it was being obeyed.

The results of the bull session were very productive. We came down to three separate groups of items, which seem to create an audit trail for professional standards.

The trail started with a list of "professional duties," items which, if not looked after, would legitimately leave a data processor open to professional condemnation in the event of a snafu.

The idea was that each "duty" should be protected by specific standards. For instance, a "duty" of "accuracy in processing" could be protected by an operational processing standard which would say that "accuracy within 10 decimal places would be provided unless the using department had agreed in writing to accept some lesser accuracy." (The ones we found are listed in the first part of the survey.)

Standard Characteristics

We then had a second group of items which briefly described the characteristics of acceptable standards. We only got this list down to two.

We thought a standard should be checked by any reasonably competent person, and certainly by someone, such as a CDP holder, who had passed some form of professional examination, as well as someone with experience in the field.

And we also thought the standard should be written so that two persons examining a situation would come up with the same answer, i.e. that the results would be reproducible.

Clearly, a standard which used words like "adequate," which involves individual judgment was not very attractive to the branch members. Who could "define" adequate?

Independent Areas

The third area really surprised me. It consisted of a list of independent areas where specific standards were needed, in order to provide an adequate audit trail to support the credibility of the final output of a DP system.

This list was saying that before anyone could really affirm that some DP output would be proper, he would have to know that each of the listed areas was being properly conducted!

He would need to know that the hardware on which the output was produced was up to standard, for instance, as well as knowing the standard of programming.

He would also need to know that the operational areas were acting properly, as well as know that the forms were printed properly. Each area represented a complete responsibility—and often a complete expertise which needed its own particular standards and experts. And a failure in any area could fatally compromise the final automatically produced result.

By the time we ended, the list consisted of no fewer than 26 independent areas. Not two, or four... but 26! That really shocked me.

Apparently a DP application—to be safeguarded—must be handled properly by 26 different "experts"—few of whom have any idea of what constitutes quality work among the other areas.

Of course this could be too many. We did not have time to see whether some areas should be omitted. Perhaps they

should be. For instance, overlapping areas should be omitted—not because standards are not essential, but simply because overlapping areas can create overlapping, and potentially contradictory, standards.

Entries Don't Belong

Each of the 26 areas was chosen because at least one of the chapter members thought the integrity of the processing could be improved. Going down the list (shown in the third part of the survey) we find some of the entries do not belong there, either because the processing would not be affected by changes in standard, or because the areas overlap one another.

This latter point is particularly important, because we could get duplicate and contradictory standards if the areas do not really fit together—a knight of old would get a sore arm if his suit of armor did not fit correctly!

Our "suit" of standards must fit as neatly and as completely as data processing is to be completely protected. (And we need that complete protection when we use data processing to produce and distribute data automatically. Or, anyway even if we don't—if our paycheck will continue unaffected—our users and uses certainly need the protection.)

The Boston branch decided it is only after all these three considerations are known—that our professional duties are known, what DP standard areas should be and what the necessary DP standard characteristics are—that it is time to actually create a particular standard!

For instance, the user's standard that the SCDP Technical Committee is currently developing deals with the acceptability of computer tape for DP purposes. It lays down the qualities that the committee thinks should be obtained from new tapes, the quality of any tape which is retained in the system. But the standard assumes that data accuracy is a duty—and that data storage is an area of concern. Until now it has been just a sporadic standard—and this only gives us sporadic protection. Now it can be fitted into the suit.

We often hear of end-point standards, the tape standard—but this is the first time I have seen an attempt at a description of the three foundation layers that must be laid before we can see whether or not we have our necessary suit of standards (perhaps we should call it a "suit" rather than a "suit").

I would like to see this work encouraged.

I would like readers to look down these lists of the foundation levels that are needed to build our DP standards. I would like each reader to critique each of them—to point to the areas that are, or are not, necessary; to point to the characteristics, or duties, that we have omitted.

This way we can start to build the complete suit of armor that data processing so urgently needs to spell the "slings and arrows" that are currently being aimed at anything to do with computers.

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Professional Survey on Prerequisites for Developing Full Suit of DP Standards

Suggested Duties of Professional Data Processors

- It is a professional duty of responsible data processors:

1. To accurately process the data in our data processing applications.
2. To present the results so that the information received by the next system, or reader, is accurate.
3. To protect data entrusted to us.
4. To give warning of all knowable dangers involved in a specific data processing operation to the responsible authorities.
5. To do the data processing work expeditiously.
6. To minimize unit cost figures.

The Characteristics of a Standard

- DP Standards should be such that:

1. A person qualified by examination and experience examining a data processing application in the light of such a standard will be able to certify that it does, or does not conform to the standard.
2. The results of such an inspection shall be reproducible, (that is, a second inspector conducting the same examination will come to the same conclusion.)

Areas of a Data Processing Operation Which Must Be Conducted in Accordance With Standards if the Integrity of a Full DP Operation Is to Be Maintained

- Do you agree these areas can endanger data processing if not handled properly and therefore should be standardized individually?

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2. The Proposals.
3. The Proposal Evaluation and Recommendation Presentation.
4. The Evaluation of Alternatives.
5. The Specification of the Application.
6. The Application Programming Specification.
7. The Software Utilities Used.
8. The Computer Diagnostics.
9. The Compiler Output Code.
10. The Operating Systems.
11. The Program Testing.
12. The Program Documentation.
13. The Program Operation.
14. Application Responsibility.
15. The Error Analysis and Reporting.
16. The Output Verification.
17. The Storage Media Used.
18. The Data Input Media.
19. The Data Preparation.
20. The Financial Auditor Facilities Available.
21. The Operator Qualifications.
22. The Operator Documentation.
23. The Operating Procedures.
24. The Data Control.
25. The Media Storage.
26. The Operation Room Adequacy.

Will You Help Develop Standards?

(Please specify area)

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Professional Position _____

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CDP? Yes ☐ No ☐ SCDP Member? Yes ☐ No ☐

By completing this form, please return to Alan Taylor, CDP, Taylor Reports, c/o Computerworld, 797 Washington St., Newton, Mass. 02160.

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Professional's Viewpoint

Let's Not Limit Professionalism

The results of the questionnaire, "Have We Formed the Wrong Society" [CW, The Taylor Report, March 15] indicated that while CDPer's were more or less happy with the adequacy of the Society of Certified Data Processors, non-CDPer's were not. They voted heavily in favor of a more general society and for only admitting practicing data processors and data processing teachers.

One respondent who feels a

The Professional Viewpoint Page is prepared by the editors of *Computerworld* in conjunction with the Society of Certified Data Processors.

more general society is needed is a 10-year veteran of the field, Hamilton Armstrong Jr. He has capes his arguments, those in favor of the new society and those regarding the usefulness of the CDP qualification, as follows:

I've been reading with interest the various articles in *Computerworld* that have appeared over the last several years on professionalism, certification, standards and the general output of the data processing community. Like many of you, I have been forced by this exposure to wrestle with many of the problems that have been unveiled.

Upon the creation of a Society of Certified Data Processors I felt the need to join this group so collectively we could hammer out the inherent problems. How-

Enrollment Form - Society of Professional Data Processors

Please enroll me as a member of the Society of Professional Data Processors.

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When completed please return to the Society of Professional Data Processors, c/o The Professional Viewpoint Page, *Computerworld*, 797 Washington St., Newton, Mass. 02186.

over, before I had a chance to make my voice heard, I was rejected because of my lack of certification - and because of my feelings that certification itself is not a sufficient remedy to the problems.

This brings up two problems - why I did not want to take the time to get certified, and more important, what can be done by those of us who are not CDPer's.

CDP advertisements show the CDP holder as possessing some of the knowledge needed by a data processing manager. I have been a data processing manager for over seven years, so what does a CDP give me? My experience is better evidence than the certificate I see no need to wait until I am certified before I get into the problems of professionalism.

And there appear to be plenty more like me. The number of CDPer's is about 13,400, so they form a minority in the profession. It would seem, therefore, that the data processing community (that is the active processors themselves, not the data processing industry which acts as our suppliers) should organize a

Does it take a CDPer to see how badly the computer-generated report card illustrated in a recent Taylor Report was handled? Does it take a professional to know when his privacy is being invaded?

I would propose we do not leave these matters in the hands of the data processing industry, or in the hands of the CDPer's. I suggest we follow the ideas recently aired here and enroll in the Society of Professional Data Processors and keep it open, as the points indicated should be done, only to practicing data processors or data processing teachers.

I ask readers to fill in the enrollment form above, and send it to the Society c/o The Professional Viewpoint Page. The sooner this is done, the sooner we will be able to improve professionalism in our chosen occupation. - Hamilton Armstrong Jr., Syracuse, N.Y.

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Random Notes

SPSS Software Adopted To Run on Series 70 CPUs

ATLANTA—The Statistical Package for the Social Sciences (SPSS), previously distributed only for use on IBM 360 CPUs, is now available in a modified form for Univac Series 70 users, from Emory University.

The National Opinion Research Center (NORC) distributes SPSS in its 390 implementation, and Emory used that with NORC's permission as the base for its version which operates under Series 70 TDOs, TSOs or VMOS.

Inquiries about the Series 70 version should be addressed to Steve Richard at the computing center, Emory University, 30322.

Laboratories Monitor, Report Blood Tests on S/7 With FDPs

WHITE PLAINS, N.Y.—Clinical laboratories using the IBM System 7 can expedite blood tests and reports with a series of field-developed programs (FDPs) from IBM.

The programs collect readings simultaneously from instruments analyzing specimens of whole blood and blood serum, then report findings by test, patient and instrument.

The FDPs carry monthly license fees ranging from \$80 to \$170 for the first 24 months of use, after which payments are waived.

H316 Assembler Runs on 1130

SAN DIEGO—Programs for the Honeywell 316 can be assembled on an 8K IBM 1130 with the DS1-316 software from Decision Sciences Inc. (DSI). Another package, DS1-216, uses the same host configuration to generate programs for Computer Automation 216 and Alpha 16 minis.

Each of the packages is written in Fortran, and is currently available from DSI, 4500 Mission Bay Drive, 92109, for \$1,500.

"Chkpt" Aids OS/360 Testing

WARREN, Vt.—The Chkpt package from Solutions Inc. optimizes test sessions for OS/360 application programs by dynamically replacing non-numeric data with dummy numeric data in the event of an O/C7 program check.

After the data substitution and a recording of the error situation, Chkpt allows the test to continue with a reexecution of the instruction that caused the program check.

The package is said to work with Cobol or Assembler programs under all versions of OS/360. It costs \$375 from Box 247, Sugarbush Valley, Vt. 05674.

File Gets Many Names

Hospital's RPG Logic Limits

By Don Leavitt
Of the CW Staff

KALAMAZOO, Mich.—By defining the same sequential data file two or more times under different file names, the DP department of Borgess Hospital realized more flexibility than originally anticipated in RPG-III and Cobol programming, according to senior programmer David R. Thompson.

The hospital "in all probability did not originate the idea," Thompson volunteered, but found it "extremely useful," particularly in situations in which a look-ahead capability could be used to trigger

a change in program logic.

In RPG-III, a single file can be coded as a primary under one name and as a secondary under another name. At Borgess, this renaming/redefining was stretched, in one case, to have the same file coded under a primary and three separate secondary names.

Borgess used 17K bytes of core in that instance, and available core appears to be the only real limitation on this technique.

Separate JCL cards with the proper ASSGN, DI-BL and EXTEND statements are required for each file name defined. Upon execution, the program processes at

if it had two or more different files.

The primary file can be read, in whole or in part, generating data to be used in a second or subsequent pass of the file, controlled by the secondary name or names.

Reread Same Records

By making the secondaries Demand files and using the verb READ, Thompson said, the program can read records up to any given point in the primary, and then go back to reread the same records, under the secondary name, because of data accumulated in the original reading.

Once the secondary reading reaches the stopping point of the primary, the "scanning" operation, under the prime name, can be repeated.

The ability to define the same file several times can also be used to combine several report runs, into the same file, into one. In this situation, the "program" using the primary file produces its report and the secondary "programs" each take their turns producing different outputs from the same input.

Borgess' DP department at 1620 Gull St., operates in a DOS environment under Release 26 on a 32K 360/22.

RPG-BMP Interface Extended to RPG-III And Dbom File Use

TROY, N.Y.—The RPG-BMP Interface package distributed by Digital Solutions Inc. has now been extended on both sides of the interface. It not only links RPG-III and the IBM DOS BL of Material Processor (BMP), but offers extended support for both RPG-III and IBM's Data Base Management/Management Processor (DBMP) as well.

The interface lets the user work in the report-generating languages, rather than Cobol, to create inventory and production control printouts. The package is distributed as a set of DOS Assembler macros with which the user builds his own interface routine tailored to his needs.

The interface links an RPG program with the I/O root phase of BMP or Dbom, and may be generated to communicate with single or multiple master files or one or more master files and their associated chain files, the company said. Master file processing includes OPEN, CLOSE, GET, PUT and START KEY functions. Chain file processing is said to allow the RPG program to follow a single-level chain or process a multilevel chain.

The package is available for a one-time license fee of \$250, from Box 424, 12180.

Agencies, Contractors Use Nasa Resource Sharing System...

HOUSTON—The ADP Resource Sharing System, set up by the National Aeronautics and Space Administration to make technically oriented programs available to users other than the developers, has been "reasonably successful," but could be doing more, according to central librarian John Leonard of Nasa's Manned Spacecraft Center.

The system was established a few years ago principally for Nasa centers and Nasa contractors, he explained; however, any computer center in government or industry can access the programs listed in the Announcement of Software Resources abstract journal, "Government," in that instance, is defined loosely enough to include local, state and federal users.

The only restriction on contractors acquiring the software without cost is that they prove that the desired program will be used on a government contract.

The proof needed by the contractor would normally be a letter from the government contracting office, Leonard said.

Organizations that cannot meet this

condition can still get the programs, but for a "modest cost," through the Cosmic clearinghouse at the University of Georgia, he said.

Wide Range of Programs

The programs in the abstract journal fall into categories ranging from aerodynamics, biosciences and chemistry to physics, space radiation and thermodynamics and combustion.

One category includes computer operation and programming aids, largely utility-type programs for a range of different CPUs. Most appear to be written in Fortran, and they are adaptable to other than the originally intended hardware.

The "Announcements" journal can be obtained from Nasa's Scientific and Technical Information Office, Code KSI, Washington, D.C. 20546.

Inquiries about availability of programs listed in the journal should be directed to the head of the Program Sharing Library, Code FD, at the Manned Spacecraft Center, here in Houston, 77058.

...NSF Funds Study of Others

WASHINGTON, D.C.—The National Science Foundation has granted \$100,000 to Public Technology Inc. (PTI) to determine the DP requirements of local and state government agencies, and how to eliminate the cost of duplicating software that already exists for these users.

The 10-month study will attempt to catalog the existing and potential mechanisms by which programs can most effectively be shared by the users, according to PTI spokesman Herb Cantor.

The concepts to be considered, he said, will include Cosmo-like clearinghouse operations, consulting services, user groups, program libraries on time-sharing

networks, or regional shared DP installations.

He noted that shared installations to be studied include those currently in operation in San Gabriel, Calif.; Eugene, Ore.; Tulsa, Okla.; and Cincinnati, Ohio. Each has some unique features, Cantor said.

PTI will be polling its subscribing jurisdictions, he said, and would be pleased to hear from other government agencies to insure that the study truly reflects what the user needs and not what PTI assumes he wants.

The NSF grant covers only the study phase of the project. Implementation of any plans resulting from the study will require additional funds, Cantor noted.

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Roger MacGowan is professor of Computer Science with the Dept. of Defense Computer Institute in Washington, D.C. and is a frequent contributor to professional journals.

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Data Base Manager

Users Get 'Isogen' in PL/1 Source Code

PRINCETON, N.J. — Described as already comparable in power to IBM's IMS/360 or Cincom's "Total," the Isogen data base management system software is distributed by National Computer Analysts Inc. (NCA) in PL/1 source code so DOS or OS users can further customize it to their needs.

Isogen can work with any file structures with virtually no limit on the logical relationships that can be established between data segments in the files supported by the system, NCA said.

Isogen was developed by Idaps Computer Science Ltd. of Australia and includes:

- A data definition system to provide the means of describing and documenting the data base and the interrelationships of its data segments.

- A source record generator to produce and insert "data division" specifications into the user-written application programs which utilize the Isogen technology.

- A software generator to create all the programming logic to perform the complex data manipulation desired by the user.

Own Access Method

The system includes its own chained-file access method for those users who want it, but it is not required to be used. All IBM-supported access methods for disks, drums or data cells are acceptable in the Isogen environment, the company said.

Application programs may be in any language and normally get to Isogen logic through CALLs.

Since Cobol does not utilize CALLs, however, an interface is supplied so that programs in that language can also work with Isogen.

Data base protection facilities with the basic system include automatic backup scheduling, data base backup and restoration, transaction logging and software control of operating malfunctions.

Isogen requires 28K under DOS or 70K under OS. Because the system is distributed in PL/1 source code, and generates PL/1, users must obviously have a PL/1 compiler.

The Isogen system sells for \$17,000, and a leasing plan may be negotiated, however, if required, NCA said from U.S. Highway No. 1, Farber Road, 08540.

'Spartan' Macros Ease BAL Programming

CHICAGO — DOS/360 users can gain the advantages of a macro-level source language, execution time efficiency of Assembler-level object code and several of the system environment features of OS, with the Spartan software from Datair Systems Corp.

Spartan is an Assembler source code generator, driven by user-completed (and if he chooses, user-defined) macros, but the system includes fully developed blocks of logic to further simplify the coding task.

A front-end module provides data entry validation, and a report generator module provides most of the usual RPG functions.

Spartan Interface

Spartan interfaces with IBM's Assembler system. Therefore users have access to both standard macro capabilities and those unique to Spartan. The Datair package includes special diagnostics for debugging its macros.

Normal Assembler source code can be included in line with Spartan macro coding, and Spartan-generated object modules can CALL or be CALLED by modules developed in other languages.

The package is seen by Datair as a bridge between DOS and OS. Spartan provides data file device independence between disks and tapes, without the special programming normally needed under DOS.

The Datair package comprises between DOS and OS on

I/O buffer area creation. DOS supports a maximum of two such buffers; OS has no limit long as there is available core. Spartan is said to provide for up to six I/O buffers, again depending on core availability.

To use Spartan, 64K bytes of storage are required, with at

least two disks, a card reader/punch and a printer. The user must also have IBM's Assembler software available.

The system can be purchased for \$18,500, and monthly lease terms can be arranged.

Datair is at 35 East Wacker Drive, 60601.

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Data Briefs

Interactive and Pooled Nets Handled by Tredata 2000

SUNNYVALE, Calif.—A data terminal that can operate in both a dedicated pooled environment or as an interactive dial-up device is available from Tredata Computer Systems Corp.

The Model 2000 can replace IBM 2740-1 and 2741 units and can communicate directly with IBM 360 systems.

The 2000 has a reverse break feature to allow the CPU to interrupt the terminal, and a hold switch to allow the user to enter additional data without breaking the communications link. The device transmits data at 15 char./sec on private and dial-up lines and is compatible with IBM line adapters, according to the company.

The 2000 is available in 60 days at a lease rate of about \$77/mo from Tredata at 610 Palomar road, 94066.

ADS 403 Has Dual Loop-Back

CANOGA PARK, Calif.—American Data Systems has a Bell-compatible 103-type model that can operate in both originate-only and answer-only mode via the use of plug-in modules.

The ADS 403 can operate at data speeds up to 300 bit/sec on dial-up or private nets. The model features both analog (on the line side) and digital (on the EIA connector side) loop-back capabilities for fault isolation by the user.

The model is compatible with Bell CBS and CDT data access arrangements and can perform a busy-out function in direct replacement of a Bell 103E data set, the company said. The 403 costs \$550 or \$18,700/mo on a three-year lease. Delivery is 30 days from 8851 Mason Ave., 91306.

Microdata Adds Controllers

SANTA ANA, Calif.—Microdata Corp. has two synchronous controllers which enable Micro 1600 mini-computers to communicate with local and remote asynchronous devices. The Model 2612 and Model 2612-1 controllers service eight and four, full-duplex channels respectively.

Each model can be installed in a single Micro 1600 I/O card slot. Connectors on the interface board accommodate cables to modems and to terminals with either the RS-232-C Standard or a current-loop interface. Prices are \$200/channel for the 2612 and \$250/channel for the 2612-1. Microdata is at 644 E. Young St., 92705.

Experts Differ

Satellite Data Too Costly?

By Ronald A. Frank

NEW YORK—When satellite circuits become available, hardware and software problems will put them beyond the reach of today's data communications users.

This is one of the findings of a report issued by the technology group of Salomon Brothers which analyzes the adaptability of new communications technologies to meet the needs of data users.

Inherent Time Delay

The inherent time delay in satellite transmissions will require the user to re-write his software and add buffer storage capabilities to his network, according to Robert E. La Blanc, manager of the technology group. Until satellite circuits become "sufficiently less expensive than terrestrial facilities," they will not be cost effective for the majority of data users, La Blanc said.

The major time-sharing networks will benefit most from satellite services since they already have delays built into their operation. The user won't know whether a delay in accessing a time-shared CPU is being caused by the queue waiting for a processor port or perhaps caused by a satellite transmission, La Blanc said.

The time-sharing vendors will be able to "spread the software costs to overcome the satellite delays," over their large subscriber base, but individual users will have to absorb these costs, La Blanc said.

But Ralph Miller of Cosmos Engineering feels the companies that provide satellite circuits will have to provide data users with complete communications packages.

The user will have to connect his computer to a satellite transmission system in the same way that a dial-up user now connects to the telephone network.

120 Char./Sec Added To GE Terminate Line

LYNCHBURG, Va.—The communications systems division of General Electric has upgraded its Terminate teleprinter to operate at 120 char./sec.

Designated the Terminate 1200, the unit has switch selectable speeds of 10, 30 or 120 char./sec. The 1200 is available in three models: receive-only, keyboard send-receive, and automatic send-receive.

The terminal handles "94 printable graphics" including the full ASCII character set, a spokesman said. The first speed terminal is scheduled for high speed deliveries next October.

The current Terminate model 300, which operates at 30 char./sec, costs about \$3,000 for an RS model and \$5,500 in an ASR configuration. The 1200 will cost "about 30% to 35% more, according to a GE spokesman."

Today's signal may make use of several differing technologies including cable, microwave and time-division multiplexing.

And the carrier that provides satellite circuits as part of its system will have to give the user this same kind of transparency, Miller said.

Carrier's Warranty

"The individual carrier, not the user, will worry about the delay and how to overcome it," Miller predicted. The greater available bandwidth and the superior quality of the circuits will make them much more desirable than present telephone facilities, Miller said.

In evaluating the growth of Bell's Picturephone network, the Salomon Brothers report said that by 1980 there were 500,000 stations could be in operation.

While admitting this projection may be somewhat optimistic, La Blanc said that 25% of the Picturephone network will be utilized for data transmission. The need for "inexpensive digital transmission facilities" will cause data users to go to the new network, he said. Once a Picturephone network is in operation, users will have up to 1 Mbit of switched service bandwidth available.

And data users will use these facilities regardless of whether Picturephone catches on, La Blanc said.

Tempo II With 270T May Save Users 30% Compared to 370S

WHITE PLAINS, N.Y.—Tempo Computer, Inc., a division of GTE Information Systems, has a front-end processor which it says is faster and cheaper than the IBM 370S.

The Tempo II, when combined with the 270T terminal control processor system, offers 360 and 370 communications users a savings of about 10% on a two-year lease and a cycle time of 750 nsec, compared with the 370S's cycle time of 1.2 usec, a Tempo spokesman said. Savings of up to 30% on a five-year lease are possible, he said.

With direct memory access, the Tempo II can transfer data at rates up to 1.1 Mword/sec using cycle-steered methods, the company said. A built-in program load capability on the Tempo II includes a read-only memory that enables users to initiate program operations from teleprinters, disk and drum memory systems, magnetic and paper tape and both synchronous and asynchronous communications equipment. Card readers, line printers and interface adapters can be supported with the processor.

The Tempo II in a 270T system can

208 Modem Installed

NEW BRUNSWICK, N.J.—One of the first Bell 208 4,800 bit/sec data sets is operating at Rutgers University.

Installed on a special assemblage basis pending approval of a final New Jersey Bell tariff rate, the data set is operating on a dedicated line with Montclair State College.

An 1130 CPU at Montclair State is transmitting data to a 360/67 at Rutgers as part of Bell's Data-Phone 4800 service. The 1130 is acting as a remote batch terminal to the Model 67 which processes administrative, instructional and research data, according to David Kantor, manager of systems development.

Rutgers previously used a Bell 201A data set on a dial-up line to communicate with Montclair, with the 208 throughput has more than doubled, Kantor estimated.

The 208 features analog and digital loop-back tests which are included as part of the seven status lamps on the front of the unit. The 208 has a 50 character/second time-out and an adaptive equalization to "correct for any delay or amplitude variation" on the channel, Bell said.

A three-position test switch on the front of the 208 allows both local and remote tests by the user.

The Rutgers 208 costs the school \$100/mo with an installation charge of \$100. The earlier model Bell 203 that also operates at 4,800 bit/sec costs local users about \$190/mo, a New Jersey Bell spokesman said.

handle up to 255 lines with terminal devices operating at speeds from 135 to 9,600 bit/sec. The system can operate on both dial-up and private lines and speeds up to 50 bit/sec can be supported on leased line systems, a spokesman said.

The Tempo II can upgrade an existing 270T system in the field and the main memory of the processor can be expanded from 4K to 65K words.

A typical Tempo II system with 8K memory console and power is priced at about \$7,500 or "under \$300/mo." A 270T system with Tempo II processor is priced at \$1,650/mo for a system up to 64 lines, with an additional charge of \$10/mo for each asynchronous line and \$25/mo for each synchronous line. Tempo is at 4005 W. Artesia Blvd., 92633.

CSMA Has Comprotek

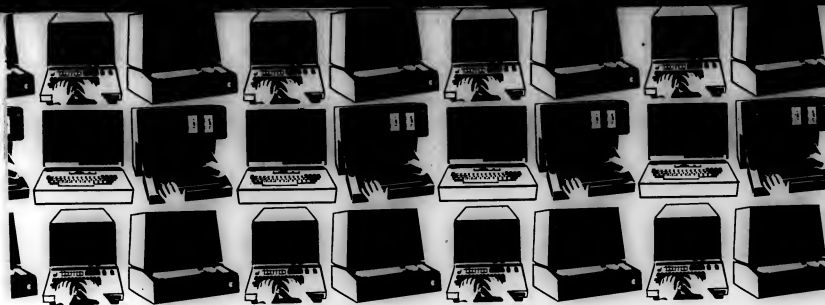
WILMINGTON, Del.—The Communications Systems Management Association is planning to provide a series of reference works called Communications Procedures and Technical Data (Comprotek). The price to CSMA members is \$100. The association is at 1102 West St., 19801.

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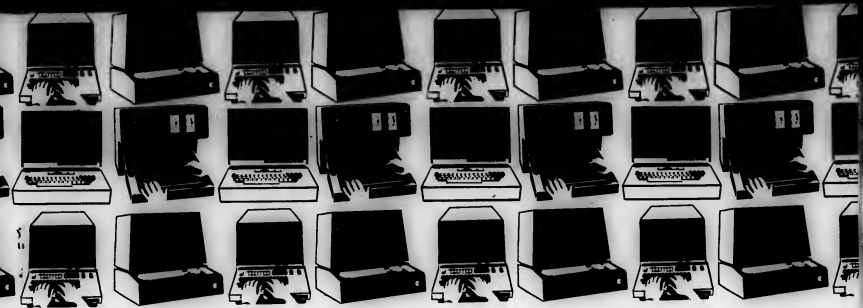
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INFOREX

Small Users Served By New CW Feature

To make it easier for small system users to keep up with the latest news, *Computerworld*, beginning with this issue, is making "The Small Systems User" page a regular feature at least once a month.

The page will consist of news of special interest to small systems users and a column that will call the attention of small system users to stories appearing elsewhere in the issue that may be of particular interest to them.

In this issue, for example, a story about a new high-capacity, fast access disk memory for the Varlen 620 series appears in the Systems and Peripherals section. There is also a story on a high-speed punched tape reader for users of the DEC PDP minis.

A cross-assembly for the Honeywell H-316 is discussed in the Software and Services Section.

'Broad Data Base' Planned

Manager Hails 'More Effective' Systems

OMAHA, Neb. — The use of a small computer system has provided "a more effective job of managing" for the H.A. Wolf Co., a business which specializes in property management here.

Real estate investment and development, mortgage banking, insurance counseling, and commercial construction are the ventures where the computer comes into play, but each "is too small by itself" to support in-house computers, according to President M.B. Coffey. "Together," he added, "they more than justify" a computer.

Coffey's company has automated general accounting applications, plus special assistance for the business ventures. For example, mortgage programs service 1,800 loans for 22 investors, applying payments against various accounts; an annual tax report for the mortgage holder and an annual escrow analysis are part of the output.

Daily computation of more than \$1 million in earned premiums, plus commissions for salesmen and premium payments, are included in the insurance applications.

Company officials seemed most enthused over the property management

The Small Systems User

system, licensed from IBM. The system gives the users "fingertip access" to data on "each of the rental units we manage," noted Dudley McGrath, vice-president.

Coded data includes number of bedrooms, square footage, color of carpeting, type of building, current tenant and rental rate (base rent, garage, utilities and other factors), McGrath said.

Wolf creates a monthly bill, listing

special charges or past due payments, as well as current monthly charges. A pre-punched card is prepared by the computer, sent to the tenant, and returned with his payment.

By having all rents come due at the same time, and all notices sent out at the same time, "we can make a quick run and have our delinquent payments pinpointed immediately," said McGrath.

This has "eliminated a tenant getting several months behind" in rent, "before we discover it and take action," he added. Cumulative monthly statements prepared for property managers give the owner tax and other accounting information needed at the end of the year, he added.

The Wolf Co. uses an IBM 3/10, and is building a "broad data base" for statistical analyses, McGrath said. This will include optimum lease period, average tenure of a unit, and cost of a vacancy in terms of lost rent and "re-do" costs, he said.

The system also brings "better control and greater accuracy," McGrath commented.

Alternatives to S/3 Predicted by Cohan

By a CW Staff Writer

LOS ANGELES — The "first real competition" for IBM's popular System 3 may be the new Burroughs 1712, according to Irwin Cohan, president of the National Association of System 3 Users (Nasu).

In a recent interview, Cohan predicted: "We'll see other new computers in the 96-column area before too long," although he would not speculate on which manufacturers might be planning new, small computers.

Cohan called the Burroughs announcement the "worst-kept secret in the industry," but said growing use of small computers and the stronghold of IBM means "Burroughs has its work cut out for it."

"The System 3 may not be the cheapest thing in the world," he said, "but nothing IBM has can be called cheap."

Besides competitive CPUs, Nasu members seem to be interested in cost-saving peripherals. During chapter meetings other vendors are often invited to demonstrate products, Cohan said.

The software situation has appeared stagnant during recent meetings, he suggested, with the exception of IBM's regular product releases. The huge manufacturer "probably has hundreds" of System 3 packages, some developed by and licensed from users in the field, he noted.

It is "fantastic" the way small computer usage is increasing, Cohan observed. Even though IBM now has from 7,000 to 10,000 System 3s in use, Cohan believes more new and competing equipment will follow the Burroughs announcement.

Wang Users to 'Swap'

TEWKSBURY, Mass. — Swap, the Society for Wang Applications and Programs, is currently being formed to create and make available an extensive multi-disciplined program library, encourage interchange of ideas, save the user the expense of developing or perfecting already available software and to provide direct user feedback to the company.

All contributed Swap programs will be maintained on a master file at the company here, and distributed to members upon request. Abstract listings and updates will be provided.

Membership fee is \$10. For more information contact Jason R. Taylor, Executive Director, Swap, Wang Laboratories, Inc., 836 North St., 01876.

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SYSTEMS PERIPHERALS

Mini Monitors Axle Production Line

Bits & Pieces

Varicomp 1000 System Drives Phototypesetter

PLAINVIEW, N.Y.—A universal composing keyboard system to provide low-cost composition input is available from Varisystems Corp. The system can drive any phototypesetter and can interface with almost every hot or cold metal typesetter by changing software, the firm said.

At the heart of the Varicomp 1000 basic system is a Varisystems PAC-16 programmable computer, an 8K-byte processor with word length of 16 bits. Additional 8K-byte memory is optional. Read/write cycle time is 1 msec, instruction fetch time is 3 msec and instruction execute time is 3 msec. Pricing for the basic Varicomp 1000 System is \$7,950 from 207 Newtown Road, 11803.

Diablo Disk Drives Added To EPI-118 Minicomputers

ENGLEWOOD, Colo.—Electronic Processors, Inc.'s (EPI) disk-drive for the EPI-118 minicomputer allows from one to four daisy-chained Diablo Model 31 Disk Drives to be used.

A complete hardware formatter is incorporated as an integral part of the EPI controller. The same EPI disk controller is used for both single-density and dual-density disks, providing 12 Mbits of storage and a transfer rate of 33,000 eight-bit word/sec for the single-density disk, or 24 Mbit of storage and a transfer rate of 67,200 eight-bit word/sec for the dual density.

EPI's disk controller, including the hardware formatter, costs \$3,850. The single-density Diablo Model 31 Disk Drive is \$6,058 and the dual-density disk is \$6,265 from 5050 S. Federal Blvd. 80110.

Portable Unit Cleans Tapes

BUFFALO, N.Y.—The 350 Magnetic Tape Cleaner from Syncom Inc. offers double life of the cleaning surface, compared to other cleaners, at about half the purchase price, according to the firm. It is said to feature quick, accurate reel alignment and rapid blade replacement.

The \$305 \$750. First deliveries are scheduled immediately from 4655 Genesee St., 14225.

Smaller Prices

Priced at \$19.95, Auerbach's Microfilm Readers/Printers from Auerbach Inc., Philadelphia, is designed to guide the user to microfilm equipment and techniques and to guide him in the equipping of his own installation.

Versatec, Cupertino, Calif., has cut the prices of its Matrix 200, and 1100 printers by up to 20%.

By Frank Piacca
Of the CW Staff

DETROIT—The Chevrolet Gear and Axle Plant here is using a minicomputer-based turnkey system to monitor and control the production and shipment of more than 350 different truck axles.

In addition to shipping and inventory control, the system also supplies Chevrolet management with details and analysis of such areas as production line output and productivity, product defect detection and repair and machine productivity.

The Telecontrol System includes a 4K-word Data General Nova minicomputer equipped with a 64K-word disk file, card reader and a teletypewriter multiplexer interface. A special Telecontrol interface for plant floor equipment is connected to the processor.

The system also includes a Vogue 880E 400 line/min printer, five Teletype ASR 33 terminals, two Telecontrol input boxes and transmitters for status and piece count signals from the plant floor.

Two of the terminals, equipped with special keytops, are positioned on the two axle subassembly production lines to enter production data.

Current Production Figures

A third Teletypewriter at the head of the axle production line provides the line foreman with up-to-date production figures.

The inspection station also uses a teletypewriter to keep track of inspection

and repair operations.

A fifth terminal, used as the system control keyboard and located in the control room, performs such functions as system initialization, data entry, report requests and system communications. Requested reports are printed on the line printer in the control room.

The terminals are all connected to the computer via the teletypewriter multiplexer.

Additional input to the system is provided by two special input boxes which combine sensors with switches. The switches indicate the type of product being produced and the sensors count the units on the production line. These are tied to the computer through a special Telecontrol scanner system which counts the pulses and decodes the type of product data.

The disk file in the control room is used for the program library and to store inventory data.

The software consists of six major subsystems.

• Axle Production Monitoring—monitors and issues reports concerning assembly line production.

• Subassembly Monitoring—monitors production of five major component subassemblies (over 150 different parts) to maintain current inventories for each subassembly.

• Shipping—maintains a balance-to-ship inventory for each model and keeps an up-to-date schedule of shipments due at each plant.

• Repair Information—maintains records of the number of defects by axle category and defect type. Analyzes defects by shift, day and week and isolates primary defect classifications.

• Production Line Monitoring—supplies and analyzes of downtime on the assembly line.

• Machine Monitoring—provides reports at the end of each shift summarizing authorized and unauthorized downtime and out-of-cycle time for 12 finish housing lathe and two transfer lines.

The system was installed by the Telecontrol Division of Vogue Instrument Corp., Richmond Hill, N.Y., over a period of eight months at a cost of about \$200,000.

Mohawk 2400 System Gains Faster CPU, More Peripherals

HERKIMER, N.Y.—Mohawk has upgraded its 2400 Peripheral Processing System with a new induction last week of hardware enhancements, and new software.

Called Phase IV, the enhanced version of the year-old 2400 offers users such advantages as a two-fold increase in core capacity, twice the processor speed, disk communications and a faster tape unit and other peripherals.

The 2400 system is intended to be used for off-line data conversion and communications.

The Phase IV systems use the \$440/mo 2400 processor with a one piece cycle time and a memory that is expandable from 16K to 64K in 8K increments.

Available with the 2400 are four tape drives available in 45 in/sec and 75 in/sec versions. Read backward is available.

Prices range from \$230 to \$445/mo.

The low-cost matrix printer includes an I/O controller and feeds speeds to 100 char/sec.

A 2 Mbyte non-removable disk drive allows direct disk-to-disk communication, access dumps from tape, cards or disks. It offers an average access time of 70 msec and is intended for installations with 13 or more keyboards. The cost is \$150/mo.

The 2468 paper tape punch is priced at \$240/mo.

The software enhancements include a choice of programs on tape that enable the 2400 to communicate directly with an IBM 2780, 2968, or 360/20 system terminal in these systems' own language.

Deliveries on the 2408 processor, tape drives and disk drives will begin in October. The paper tape punch will be ready in November and the matrix printer in January 1973 for shipment from Fallsdale St., 13350.

Uses Mini

Terminal Replaces IBM 2922

GARLAND, Texas—SCS Remcom Corp. has an intelligent terminal to replace the recently announced IBM 2922 [CW, May 3] at lower cost.

The 4780, based on a Lockheed mini, is available in three models which vary in line speed. All three offer a 4K 16-bit word (8K byte) memory with a cycle time of less than 900 nsec/word. Expansions are available in 4K modules to a maximum of 24K words. A special configuration to handle 28K is offered. Memory may be interleaved when more than one module is installed.

In contrast, the IBM 2922 is limited to 8K bytes with a cycle time of 3.6 msec. Interleaving is not available.

The 4780 is compatible with IBM 270X units and can handle EBCDIC transmissions at up to 5,600 bit/sec. The maximum rate for the 2922 is 7,200 bit/sec, according to IBM.

The options available with the Remcom unit are much more extensive than those with the 2922, the firm said. The basic system, the 4780-03, is equipped with a 480 line/min printer, 1600 card/min reader. These are roughly comparable to

the 500 line/min printer and 500 card/min reader on the 2922, the firm added. The Remcom 4780-07 offers a 600 line/min printer, while the 4780-08 increases print speed to 800 line/min.

Transfer IBM Programming

The programming for the IBM 2922 must be done on a computer and then transferred to the terminal. Remcom is currently developing an RPC compiler with editing capability.

Software packages for the 4780 will be offered on an unbundled basis at a one-time charge of about \$100 each. They include: Hesp 360 Work Station, CDC 200 User Terminal and Univac 1004 packages.

Options include 9-track tape transports, CRTs and Teletype 33 KSR terminals.

Prices on a one-year lease for the Remcom terminals are: 4780-03, \$1,065/mo; 4780-07, \$1,200/mo; and 4780-08, \$1,350/mo. Purchase prices are \$36,950, \$38,650 and \$45,525, respectively. Shipments will begin during the fourth quarter of 1972 from 2705 National Drive, 75040.

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PORTLAND, Ore. - The user who wants to get into COM (computer output microfilm) as easily as possible can give the responsibility for the complete installation to U.S. Datacorp.

The service, known as Leascom, provides the user installation with a complete turnkey production center, for a fixed monthly charge. The company will provide hardware selection and installation, site selection and planning, personnel training and software, a spokesman said.

When installed, the facility is managed and operated by the client staff which gets one week of on-site training by the firm. The hardware installed will depend on the customer's particular requirements, the company said, and could include any of the available COM recorders.

Optional Service

As an optional service, the firm will include a complete analysis of COM utilization within the user's organization performed by consultants and systems experts, the supplier said. For users planning to sell COM services, a plan is offered to aid the customer in establishing his business.

U.S. Datacorp's experience previously has been in the banking area, working for a bank group of which it is a subsidiary, but the company will offer its services to users in any industry, the spokesman said.

Software, supplied in either Cobol or 360/370 BAL versions, includes Contrive, a column-indexing package that is said to be faster and to use less memory than the page-indexing methods.

Applications packages stress software for such banking appli-

cations as direct deposit accounting, savings, consumer credit, trust and credit card.

The hardware supplied includes all equipment required for the installation, such as film developing, and copying equipment and light tables, as well as the COM recorder and peripherals. Monthly charges will depend

on the individual customer's needs. A typical installation based on a Perteo 3700 COM recorder will cost \$2,200/mo on a five-year lease or \$3,200/mo on a three-year lease, the spokesman estimated.

The first Leascom system will be installed this summer from 1500 S.W. First Ave., 97201.

Disk Drive for Varian 620 Mini Offers Five Levels of Capacity

SUNNYVALE, Calif. - A high-capacity, fast access disk memory with five levels of memory from 60K to 960K 16-bit words for use with Varian 620 minicomputers equipped with BIC (Buffer Interface Controller) option is available from Data Disc, Inc.

The Data Disc 1733 Disk Memory system uses a single 12-in. plated disk revolving at 1,800 rpm. It can be equipped with its own read/write head. Average access time is 16.7 msec. The transfer rate is 8 μ sec/word, but a 15-word buffer in the controller allows the rate to be adjusted to suit the user's needs, the company said.

Flexible Format

The disk features a flexible format that allows additional data tracks to be installed in the field, so the system can be upgraded to the maximum capacity. The disk can contain 60K, 120K, 240K, 480K or 960K words. Each track is divided into 12 sectors of 60 words.

The system includes a Data Disc 7200 disk memory and power supply, a 1233 Interface Controller, and cables, diagnos-

tics and manuals. The interface consists of a single printed circuit card.

The 1733 system is compatible with the Varian Disk Operating System and all software developed for the Varian disk, the firm said.

Prices for the 1733 begin at \$9,050. Delivery is about 60 days from 686 W. Maude Ave., 94066.

Punched Tape Reader Claimed 50% Cheaper

SANTA ANA, Calif. - The Electronic Engineering Co. of California (EECO) has a compatible high-speed punched tape reader for users of the DEC PDP minicomputers which it says can save about 50% compared to the DEC reader.

The 9000 Series of tape readers can handle data rates of 300 char./sec and is available with tape-handling options including loop, strip, fan-fold or integral spooling.

Installation instructions and instruction manual are included.

Prices start at \$1,280 for the fan-fold version from 1441 E. Chestnut Ave., 92701.

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CI Notes

Singer Signs DEC Pact

MAYNARD, Mass.—Singer Co., Simulation Products Division has signed a three-year OEM multi-million dollar product contract for purchase of up to 110 computer systems from Digital Equipment Corp.

The contract enables all Singer divisions to order computer products and related peripherals from DEC under the OEM quantity discount agreement. DEC computers will be used in Singer's Link trainer simulator systems.

Four Phase Has New CPU

CUPERTINO, Calif.—One of the key elements in the Four Phase contract with Western Union (CW, May 31) involves a new version of the Four Phase central processor, which will be introduced this fall.

The unit has 74K of memory and can handle up to 32 full screen CRT displays. In contrast with the present unit which can handle only up to eight full screen displays.

The memory is expanded by using 2K chips instead of the present 1K and by placing 36 on a board instead of the present 24.

IBM Announcement Seen

PALO ALTO, Calif.—Several independent peripheral manufacturers are expecting a series of new IBM CPUs this July.

In addition to the long awaited 125, they expect several new machines in the 155 and 165 class, thought to be called the 157 and 167. Memory makers are particularly worried, because their latest intelligence seems to indicate that all memory will be pulled "under the hood" and will not be subject to replacement with independent memory.

Supershorts

Codon Corp. has agreed to assign Data Products Corp. exclusive U.S. marketing rights to Codon's computerized distribution management information system.

MSI Data Corp. has installed its 10,000th MSI terminal.

True Data Corp. has received an order for 102 Model 800 card readers from Remcom Manufacturing Co., Inc. for incorporation into a new line of Remcom 2775 replacement terminals.

Entrex, Inc. has booked orders for 60 System 480 key-to-disk systems in the first four months of 1972.

Insurance subsidiaries of CNA Financial Corp., Chicago, have contracted with the Data Products Division of Lockheed Electronics Co., Inc. for marketing of a proprietary configuration of the SUE minicomputer systems to independent insurance agencies.

Inforex, Inc., has been assigned U.S. Patent No. 3,557,708 covering technical aspects of its basic products. The patent applies to data-entry systems. The patent applies to the swapping of format controls between the system's disk and memory units, the pooling of keystrokes for input data, each with independent format control, and the retrieval of certain information from memory.

Senator Requests Reports

Multinationals to Come Under Scrutiny

WASHINGTON, D.C.—The Senate will be taking a hard look at the activities of multinational corporations, such as most U.S. mainframe computer makers, in the next several months.

Sen. Abraham Ribicoff (D-Conn.), chairman of the Senate Subcommittee on International Trade, recently invited all interested parties to submit "factual, documented papers covering key issues raised by the activities of multinational corporations."

The computer industry—not only the large mainframe makers, but also the smaller, independent peripheral makers now moving into the overseas markets—are expected to figure in the investigations.

tions in a large way, sources here said.

Ribicoff said legislation designed to save American jobs by eliminating certain tax privileges enjoyed by multinational corporations and by establishing a wide range of import quotas is currently pending before the Committee on Finance.

In spite of all the rhetoric on the alleged benefits and costs of multinational corporations, there is still an abundance of ignorance surrounding the operations and effects of multinational corporations, he said.

The subcommittee, he stressed, is interested in quality submissions, well documented by factual material covering the following issues:

- Do the problems, or "costs," generated by the spread of multinational corporations outweigh the advantages or "benefits"?

- What kinds of action are open to national governments, including the U.S., acting separately or together, to maximize the benefits of multinational corporations and minimize the costs as they affect the goals of achieving full employment and balance of payments adjustment?

- The effects of multinational corporations on U.S. labor in manufacturing industries.

- The multinational firm and the balance of trade and payments

- Technology, R & D, and the multinational firm.

Several of the large computer companies have been pressing the view that multinationals contribute more to the U.S. than they take away, sources noted.

In addition, these firms have noted that U.S. computer companies contribute a trade surplus which helps the U.S. balance of trade position.

However, critics of IBM have indicated that they might use the balance of trade surplus in order to gain some antitrust exemptions in the U.S.

Number of Profitable Firms Rise In Remote Computing, T/S Area

PHILADELPHIA—The number of profitable firms in the remote-computing and time-sharing area has risen to 40 from the 28 listed last year, according to Time Sharing Information Services, Inc.

At the same time, a research firm notes that the time-sharing utility predicted several years ago has not emerged, but a "remote computing utility" seems to be growing in its place.

The time-sharing utility has not emerged for several reasons, the firm said.

"First, the pioneers in time-sharing had not counted on the difficulties of system integration. Remote-computing is a combination of computers, communications and terminals. To be viable as a business all three components must be operational and cost effective," the report says.

"This system integration combined operations systems which were not what the computer manufacturers had promised; phone lines not suitable for data transmission; and terminals which appeared not to be aware of the National Bureau of Standards, much less its purpose..."

Economics Less Compelling

"Second, computers aren't that expensive, and their cost is still coming down. Thus, the economic reasons for sharing a computer have become less compelling."

"Third, time-sharing companies began learning they can more successfully and profitably sell service and tools for solving problems than merely offering raw computing power..."

But since the idea of a time-sharing utility has fallen by the wayside, a new concept, the remote-computing utility has risen to take its place, the firm notes.

"The financial squeeze forced time-sharing which has been its main dependence on the one-time problem solver who had proved a disappointment as a profit generator. This was when time-sharing companies learned they had to talk less about raw computing power and more about services."

This, coupled with a surge of business customers that appeared in 1971, created a need for a network of remote computing centers, the report said.

"The network customer is the one who needs a computer/communications system which can be used anywhere through a large geographic area to access a common computer system and its files, thus enabling these users to share programs and data," the report explained.

"Remote-computing networks," the firm added, "provide the user with a total systems approach to his data communication

needs. The user gets a reliable, professionally maintained system with more redundancy, security and reporting than he alone could afford; he pays only for that he uses."

The firm predicted that the market for net networks would grow "rapidly" in 1972.

After Recession

Changes Seen in European DP

NEW YORK—"After the 1971 recession the European computer industry will not be the same," observed M. Andre Chargaud, president of Diebold Europe. "And more aggressive strategies are now a necessity for even the largest manufacturers."

"New approaches, and new services of an improved quality are the daily diet of service companies," he said here recently. Since the DP industry had known only a boom time of business expansion, a business slowdown therefore hit it particularly severely, he said.

"Most manufacturers did not make their quota. In major countries some of the larger companies made less than 50% of their order quotas. Shipments were not affected in any important way since 1970 had been a good year for order taking."

"For service companies 1971 was a 'shake-out' year. In the UK casualties multiplied. Everywhere else manpower went down and profits plummeted."

"1972 has seen the return of confidence everywhere and this is probably the main factor in today's business recovery."

"For the European computer industry, recovery is still slow in a much more selective and conservative market. Begun in the 1971 slowdown, a major restructuring of that industry is taking place, Chargaud said.

"The European computer industry is taking place, Chargaud said.

"The big move came early in 1972 when CII, Siemens and Philips decided to join their efforts in the computer field. This move came rather late and is still only half of a solution to the task of making the European computer industry a successful one," he added.

"In their home market, European manufacturers have, in most cases, an acceptable market position. Based on the value of installed equipment, he said, CII has 44% of the British market; Siemens has 13% to 14% of the German market; and CII has 4% to 5% of the French one.

"But computers are sold in a world market and it is at that level that success or failure will come," he observed. If exports are included, ICL has 2.9% of the world market; Siemens 1.1%; CII and Philips each less than 0.3%. In other words, together they have less than 5%.

"And yet ICL has not joined Siemens, Philips, CII, leaving the group with a world market penetration of less than 2%. This is low for an industry to be able to compete effectively on a worldwide basis."

Chargaud explained one of the reasons given for the nonparticipation of ICL is the fact that that company wants to follow the route of having non-IBM compatible systems whereas its continental counterparts feel that a large degree of compatibility should be planned.

"By the late 1970s when the new systems resulting from the 'club's' activity reach the market, technological advances will have made that problem obsolete."

The clarity stated intention of all parties is not to merge their computer activities although the February 1972 agreement has often been described as a merger, he said. "Cooperation is the word: each partner will retain his identity and his business activity."

"The group will work together in many fields, including the redistribution of manufacturing and probably the establishment of common subsidiaries for research and specific production."

"It is an important step forward but is not sufficient. Against monopolistic competition, European manufacturers must merge their activities as soon as possible to succeed," he emphasized.

"A more powerful group would not by any means be a serious threat to American-made computers (either manufactured in the U.S. or locally). It might, however, strengthen competitive elements (to some extent) some market segments, leaving many business opportunities for American ADP firms," Chargaud continued.

Isomet Develops Erasable Optical Recording Medium

OAKLAND, N.J. — Isomet Corp. has developed an erasable optical recording medium using doped single crystal lithium niobate (LiNbO₃).

The local rearrangement of electrons in the crystal permits a stored image to be erased and a new recording performed in the same crystal area. No wet processing for development or fixing is required. This permits real time recording and read-out, the company explained.

For holographic recording the material supports a phase volume hologram, which results in high diffraction efficiency holograms and multiple image storage in depth, according to the firm.

Light from an argon laser is split into two beams. The signal beam is modulated by the test pattern transparency and then focused by a lens to a 2 mm spot at the crystal location.

The reference beam intersects the signal

beam at the crystal location, and the interference pattern of the two beams is recorded. For readout, the signal beam is turned off and the reference beam, upon passing through the hologram, will reconstruct the original pattern on the screen.

Some typical characteristics for holographic recording for a 1 mm thick slice of Isomet No. 127 doped LiNbO₃ are: resolution, 4,000 line/mm; exposure

New OEM Products

time, 20 msec; diffraction efficiency after enhancement, 1.5%.

Erase may be accomplished either optically or thermally. At room temperature, the thermal lifetime of a stored image is believed to exceed several months. For archival storage, a periodic



Perlec Communications Module

refresh cycle will be needed.

Prices vary widely depending on the customer's individual requirements, the company said. Delivery will take from three to 10 weeks from 103 Bauer Drive, 07436.

Perlec Adds to Line

LOS ANGELES — Perlec Corp. has introduced a modular communications system, a 100 Mbit disk drive and a tape transport. The data communications logic modular series provides binary synchronous communications in either Asii or Ebcidic languages. The system uses microprogramming techniques and adapts commonly used input/output devices to



EAI Tape Cassette Transport

IBM compatible data communications systems, according to the firm.

Because of the variety of interface levels available, the communications logic modules can be used for point-to-point devices, remote terminals, credit verification systems, as remote site 270/2780 equivalent systems, and as multiple purpose on- or off-line data entry systems incorporating communications capabilities.

The D-3000 series disk drives for 2315 disk or 5440 cartridge in single or dual disks with up to 100 Mbit capacity in one drive are also available now.

The disk drives are identical in appearance, size and interface and are interchangeable to accommodate either front loading or top loading configurations.

Requiring an 8-3/4-in. height by 26-in. depth of rack space, the drives have an average access time of 35 msec.

In addition, Perlec has developed a 10-1/2 in. reel synchronous digital magnetic tape transport.

The T-4000 series are IBM and Asii compatible and available in read-after-write, read/write and read only models with tape speeds to 45 in./sec and data transfer rates up to 72,000 char./sec.

Other Products

Omron Systems, Mountain View, Calif., has announced a head/track disk memory with a data transfer rate of 7.5 MHz and an average access time of 5 msec, called the Omron 6000.

Electronic Associates, Inc. has introduced a cassette tape transport designed specifically for OEM digital applications. Single and double capstan models, with and without electronics are available.

The Per Data Series A-800 Analogue Tape Transport is available for \$2,550 each in OEM quantities from Peripheral Data Machines, Hicksville, N.Y.

ICP cassette recorders from International Computer Products, Inc. include the PT-1, which permits bidirectional character-by-character operation during both record and playback on an asynchronous basis up to 350 char./sec.

Cadmac, a computerized interactive graphics system developed by Computer Equipment Corp., Rockville, Md., utilizes a single work surface and processing system for both digitizing and plotting functions. Cadmac offers compatible, stand-alone capability including control-processing, visual display facilities and software for developing a design from initial sketch or diagram to finalized drawing and/or control tape, the firm said.

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LEASES AVAILABLE

DPF Plans to Offer Full Range Of Services, Support for 360s

By E. Drake Lundell Jr.
Of the CW staff

HARTSDALE, N.Y.—It is no longer adequate for a leasing company to offer only financial services to computer users; they must now offer a complete range of services, according to Mike Creedon, vice-president of marketing at DPF Inc. The leasing companies have to offer the complete line, he said, so the user will have a choice of options when considering computer equipment and will not be dependent on IBM.

To do this, DPF will begin offering independently produced disks, core memory and software support for IBM 360 leasing customers, Creedon said. DPF plans to put together a consortium of companies instead of acquiring firms in the field, he indicated.

The independents have interests that are similar to the leasing companies, he said, so tie-ups between them are natural.

Single Source

With this type of arrangement the user can look on the leasing company much the same way he does on the mainframe manufacturers, as a source of a full system of CPUs, peripherals and software, he said.

DPF is in a good position to make this type of move because it has just written down its investment in 360 equipment to the tune of \$42 million, according to DPF President Bertram Cohn.

The move "makes us more conservative than practically all others" presently in the leasing business, he added, in the field of accounting.

The adjustment was necessary in order for DPF to fully pay off its 360 investment by 1979, he added, at which time the firm expects the entire inventory to be paid for.

In the near future, Creedon said, DPF will be announcing agreements with firms that manufacture 3330 replacement disk drives, high speed core and other core memory, and expects to offer OS and DOS support for IBM users.

In addition, the firm will offer hardware and software monitoring services to 360 customers to enable them to tell exactly how efficiently their equipment is being utilized.

Many firms feel coerced to go to the 370 from IBM, he said, even though they are not fully using their 360 equipment.

Offering the newer IBM compatible peripherals to present leasing customers will have a moderately bearish effect on the present inventory of peripheral equipment, Creedon admitted, but he said the firm was confident it could release returned peripherals both to new markets here and to the European marketplace.

DPF, he added, will also move cautiously into the 370 leasing marketplace, perhaps by offering packages to a selected number of users in this area.

"You have to cater to the user's needs," he noted, adding that many users want to

be able to upgrade from their 360 equipment to 370s.

In this regard, Creedon said DPF would accept any System 360 owned by the current user as a trade in or credit to be applied to a larger DPF supplied 360 or 370.

If the present user does not want to sell the 360 outright to DPF, he said the company would offer to remarket on a new lease the user-owned 360.

DPF will also offer a complete service to the customer, including ordering peripheral equipment, arranging maintenance, and other services.

"There are many users, he said, "who know they could get more out of their System 360 but feel trapped into going to the 370 because they are not sure who will support the 360 in the future."

"DPF is dedicated to System 360 and will provide full support services to these customers," he claimed.



Biggie Passes Test

Preshipment acceptance testing of a TBM memory system, developed by Ampex Corp. under a U.S. Government contract, has been successfully completed, according to Dr. William A. Gross, Ampex vice-president, research and advanced technology. It is the first of the presently available trillion-bit memory systems to pass such a milestone, Gross claimed.

Testing by the government simulated computer environment, and all functions including search, read, write, erase, update and tape interchange, were performed singly or simultaneously, in various combinations.

Final phase of the four-week tests consisted of 10 days of continuous (22-hour/day) operation. The TBM memory system uptime during the full testing period was 98.3%, Ampex said.

The TBM memory system is a modular system with a storage capacity ranging from one-tenth of a trillion bits to three trillion bits.

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GTE INFORMATION SYSTEMS

Honeywell to Maintain Other Firms' Products

WALTHAM, Mass.—Honeywell will provide nationwide maintenance and service for four computer industry firms, according to William J. Herbert, manager of business development in the Field Engineering Division.

Honeywell will service Data Devices' tape cleaners and testers, including the new Mark IV tape cleaner, and Rixon models which transmit data at speeds of from 1,800 to 9,600 bit/sec.

Cambridge Memory Inc. has signed for services on its plug-compatible 360/Core Memory Systems.

The contract with Data Recall Inc. covers add-on core memories and calls for additional staffing by Honeywell and additional training of Honeywell field service engineers.

Data Products Turns Around

WOODLAND HILLS, Calif. — Data Products Corp. managed a sharp turnaround in operations for the year ended March 25, finishing with the strongest quarter of the year.

Revenue from continuing operations improved 16% from \$43.9 million to a record high \$50.9 million. Earnings were \$703,000, compared with a loss of \$10.6 million the year before.

In the fourth consecutive profitable quarter, earnings reached \$215,000 on revenues of \$12.4 million. "It is significant to note that while the year has been one of consolidation of operations, reduction of expenses, and adjustment to marketplace realities, we have achieved record shipments and have continued a strong developmental and marketing effort," said President Graham Tyson.

Acquisitions

System Development Corp. has acquired Mechanics Research Inc. (MRI), a civil and mechanical engineering firm, for cash and warrants. MRI will operate as a wholly owned subsidiary.

Control Data Corp. has agreed

in principle to acquire Syntonic Technology, Inc. for an estimated \$6.9 million worth of Control Data common stock. Syntonic Technology is a computer equipment maintenance firm.

University Computing Co. has sold its Digitizer product line to A.E. Trelio & Associates of Broomfield, Pa. UCC Communications Systems Inc., a UCC subsidiary, will continue to provide maintenance on the equipment.

Cybermatics Inc. has acquired Automated Labels and Forms, Inc. for cash and six-year notes aggregating \$425,000.

Eldorado Electrodata has acquired the Nanosecond product line of Data Research Corp., Lafayette, Calif.

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Telox Earnings, Revenues Decline For the Year; Many Factors Cited

TULSA, Okla. — Near the top of Telox Corp.'s list of reasons why revenues and earnings declined for the year ended March 31 was a reduction in sales to independent leasing companies.

Other factors cited were "intense competition," i.e. IBM's fixed term lease plan, and the interim delay between the phase out of Model 5314 disk drives and 4500 tape drives and the introduction of new products, such as its high-speed train printer and model 6400 tape drives.

Revenues for the year sank to \$73.6 million from last year's \$81.5 million. Earnings fell to \$1.3 million or 12 cents a share compared with \$5.5 million or 53 cents a share in the 1971 fiscal period.

User Shipments Decline

The sales value of peripheral equipment delivered to end users during the year was down to \$61.9 million from \$80.9 million last year. About \$32.2 million or 52% of peripheral equipment volume was sold to leasing firms, compared with \$48.1 million or 59% the year before.

Rental revenues involved under the operating method of accounting, totaled \$9.7 million compared with \$2.4 million in 1971.

European operations registered a loss of \$899,000 or 9 cents a share, and discontinuance of the Direct Access Storage facility in California showed on the books as an extraordinary charge of \$882,000 or 8 cents a share.

The backlog for products also declined. As of March 31, Telox had firm orders for sale or lease of equipment having a sales value of \$43.1 million compared with \$65.3 million last year.

Intel Shows Loss For 1st Quarter

SAN FRANCISCO — First quarter earnings slumped at Intel Corp. to a loss of \$1.5 million, or 21 cents a share.

In the comparable period a year ago, earnings after discontinued operations were \$2.1 million or 30 cents a share. Revenues declined to \$19.4 million from \$27.7 million in the same period of 1971.

President Peter Redfield, however, is projecting Intel will return to profitability during the fourth quarter.

"Intel's programs in computer products and financial services are proceeding well and on schedule," Redfield said. The Computer Leasing Division has about 99% of its equipment on lease or committed to lease at all times, he noted. The Data Processing Division has increased its client base during the quarter, and "the success of our Computer Products marketing program has far exceeded expectations," according to Redfield. The Information Storage Systems Division is operating in a loss position, a condition expected to continue until the fourth quarter when deliveries of the new 3330-type disk drive system are expected to begin, Intel said.

Nickels & Dimes

The Honeywell Bull Group reported earnings of \$16.5 million for 1971, on revenues of \$348 million.

\$\$\$

Information Control Corp. (ICC) and IDS Leasing Corp. have concluded a lease financing agreement that will allow ICC to increase the volume of equipment leased.

\$\$\$

Digital Computer Controls' sales for the year ended Feb. 29 rose five-fold, to \$3.3 million, while earnings soared from a loss of \$178,766 to a tidy profit of \$15,804. The firm expects first quarter figures to dip below those of recent quarters, but with growth continuing in the second quarter.

\$\$\$

Name Game: United Utilities is now known as United Telecommunications.

\$\$\$

Cash Hungry: I/O Devices is "exploring all appropriate means including debt financing, equity financing, merger or other financial arrangements in order to relieve a current working capital shortage." I/O Devices has back orders for 274 of its Model 100 printers, but needs capital to produce them.

\$\$\$

Raytheon's first quarter ended April 30 registered a profit for the highest sales and earnings in any quarter.

\$\$\$

A penny here...Burroughs' quarterly dividend will be 16 cents a share payable on July 20 to stockholders of record June 23. The previous rate was 15 cents a share.

Earnings Reports

SPERRY RANCO
Year Ended March 31

	1972	1971
Rev	8,177	\$2,211
Revenue	1,823,937	1,739,381
Earnings	960,780	72,280
Loss	1 Mo Str	80
Revenue	448,791	448,024
Earnings	10,043	10,043

—After providing in the fourth quarter, for converting the majority \$14 million related to plant and discontinued operations lines, a change in accounting method for investments in 20% owned companies resulted in earnings increase of \$5.2 million.

COMPUTER INSTRUMENTS
Year Ended March 31

	1972	1971
Revenue	\$1,325,724	\$1,246,746
Earnings	52,186	(22,808)

ROCKWELL COMPUTER
Year Ended March 31

	1972	1971
Rev	8.57	8.57
Revenue	\$1,807,952	\$4,804,987
Loss	14,628	\$6,857,797
Earnings	1,996,917	(5,113,803)

—Credit: gain on purchase of debentures and tax loss carryforward.
—Debit: loss from discontinued operations and sale of subsidiary companies and other assets less gain on purchase of debentures.

PLANNING RESOURCES
Three Months Ended March 31

	1972	1971
Rev	6.19	6.14
Revenue	\$19,862,027	\$19,012,318
Earnings	896,571	812,020

—Debit: loss from discontinued operations and sale of subsidiary companies and other assets less gain on purchase of debentures.
—Restated to reflect discontinued operations and acquisitions on a pool-of-interests basis. Includes re-e-

ness of \$697,101 in the quarter and \$2,011,000 in the nine months from international Reservations Corp.

OPTICAL SCANNING
Three Months Ended March 31

	1972	1971
Revenue	\$2,643,208	\$2,015,131
Loss	50,116	1,015,139
9 Mo Rev	7,953,687	6,217,888
Sec Chg	1,888,000	98,477,829

—Re-stated to reflect change in accounting method regarding the third-party interest. —Cumulative effect of changes in accounting principles.

BOLT BERANEK AND NEWMAN
Three Months Ended March 31

	1972	1971
Rev	8.04	8.04
Revenue	4,839,400	4,189,900
Loss	0	87,100
Op	26,000	48,400
8 Mo Rev	13,784,000	12,256,700
Loss	0	277,800
Earnings	967,800	173,100

AGS COMPUTERS
Three Months Ended March 31

	1972	1971
Revenue	269,838	237,902
Loss	0	6,078
Op	27,762	288

TRACOR COMPUTING
Three Months Ended March 31

	1972	1971
Rev	8.04	8.04
Revenue	2,224,000	\$1,728,000
Op	0	2,000
Tax Exp	47,000	4,000
Earnings	111,000	20,000

—Restated.

Computerworld Stock Trading Summary

All statistics
compiled, computed
and furnished by
TRADE-QUOTES, INC.
Cambridge, Mass. 02138

CLOSING PRICES THURSDAY, JUNE 15, 1972

PRICE							PRICE						
E X C H	1972 RANGE	CLOSE JUN 15 (1)	WEEK HIGH	WEEK LOW	PER CENT CHANGE	E X C H	1972 RANGE	CLOSE JUN 15 (1)	WEEK HIGH	WEEK LOW	PER CENT CHANGE		
SOFTWARE & TOP SERVICES													
O	ADVANCED COMP TECH	1-2	1 3/8	1 3/8	+1/8	+10.0	O	REYNOLDS & REYNOLDS	15-22	19 1/4	19 1/4	-1/4	-1.2
A	APPLIED DATA RES.	5-7	4 1/2	4 1/2	0	0.0	O	STANDARD REGISTER	16-20	16 1/4	16 1/4	-1/4	-1.1
N	AUTOMATIC DATA PROC	72-81	90 5/8	90 5/8	+3/8	+4.0	N	TAB PRODUCTS CO	17-21	17 1/2	17 1/2	-1/4	-1.0
O	AUTO SERVICES	0-1	1/8	1/8	0	0.0	N	UNICO	22-24	23 3/8	23 3/8	+1/2	+2.1
O	COMPUTER DIMENSIONS	0-14	1 1/2	1 1/2	0	0.0	N	MARLASS MAGNETICS	8-11	9 5/8	9 5/8	+1/4	+2.7
O	COMPUTER NETWORK	0-7	1 1/4	1 1/4	-1/8	-2.3	N	MALACUS BUS FORMS	22-26	23 1/2	23 1/2	-1/8	-0.5
N	COMPUTER SCIENCES	7-10	7	7	-1/2	-6.6	N	SUBROUSING CORP	147-180	185 3/4	185 3/4	+5/8	+2.9
O	COMPUTER TECHNOLOGY	8-1	5 1/2	5 1/2	0	0.0	N	ZOLLING RADIO	14-20	14 5/8	14 5/8	-1/2	-3.3
O	COMPUTER USAGE	0-14	10 3/4	10 3/4	0	0.0	O	CONTROL DATA CORP	43-74	72 1/2	72 1/2	+3/8	+3.3
O	COMP AUTOMOT REPORTS	5-9	5 5/8	5 5/8	-1/4	-4.1	O	DATA GENERAL CORP	56-98	94 1/2	94 1/2	+1/2	+0.5
N	COMPUTING & SOFTWARE	10-20	18 3/4	18 3/4	-3/4	-3.7	O	DIGITAL CORP CONTROL	10-25	12 1/4	12 1/4	+7/8	+6.0
O	COMRESS	1-1	1 1/4	1 1/4	+1/4	+5.0	N	DIGITAL EQUIPMENT	72-97	88 1/2	88 1/2	+1/4	+0.5
O	COMSHARE	5-10	7 7/8	7 7/8	+1/8	+0.7	N	ELECTRONIC ASSOC.	8-13	11 1/4	11 1/4	+3/8	+1.1
O	DATA AUTOMATION	1-1	1 1/4	1 1/4	0	0.0	A	ELECTRONIC ENGINEER	8-14	8 5/8	8 5/8	-3/8	-4.1
O	DATAMATION SERVICE	1-1	1 1/2	1 1/2	+1/8	+6.2	O	GENERAL AUTOMATION	13-26	23 1/2	23 1/2	+1	+4.5
O	DATATAC	5-8	5 1/2	5 1/2	-1/2	-8.3	N	HENLETT-PACKARD CO	130-154	152 1/2	152 1/2	+3/8	+2.2
O	EDP RESOURCES	4-8	4	4	-1/4	-5.8	N	HONEYWELL INC	355-406	407 1/2	407 1/2	+3/4	+1.2
O	ELECT COM PROG	3-5	2 7/8	2 7/8	0	0.0	N	INTERDATA INC	8-10	10 1/4	10 1/4	-3/8	-4.8
N	ELECTRONIC DATA SYS.	43-65	61 1/2	61 1/2	+1/4	+0.6	O	MINICORP	5-10	9 1/4	9 1/4	-1/2	-5.1
O	INFORMATICS	1-2	2 3/4	2 3/4	+1/8	+3.5	N	NCR	29-35	33 1/4	33 1/4	+7/8	+2.7
O	I.O.A. DATA CORP	0-12	8	8	0	0.0	N	SPERRY RAND	20-41	39 1/2	39 1/2	+1/4	+1.0
A	ITEL	9-12	9	9	0	0.0	A	SYSTEMS ENO, LABS	11-16	15 1/8	15 1/8	+1/7	+0.5
O	KEANE ASSOCIATES	4-9	7 1/8	7 1/8	-1/4	-5.5	N	VIRIAN ASSOCIATES	14-24	24 1/4	24 1/4	0	0.0
O	KEYBATA CORP	7-11	14 1/4	14 1/4	+3/4	+2.6	N	VICTOR COMPUTOMETER	15-24	24 1/4	24 1/4	0	0.0
O	LOGICON	4-9	7 1/8	7 1/8	-1/4	-5.7	N	WANG LABS.	35-60	56 1/4	56 1/4	+2	+3.6
O	MANAGEMENT DATA	8-10	8 1/4	8 1/4	+3/8	+4.7	N	XEROX CORP	324-359	353 1/4	353 1/4	+1/4	+1.4
O	NATIONAL CSS INC	8-24	23 3/4	23 3/4	+1/2	+17.2							
O	NAT COM ANALYSTS	1-1	1	1	+1/4	+33.3							
O	ON LINE SYSTEMS INC	8-16	16 1/4	16 1/4	+3/8	+2.3	A	BOOTH COMPUTER	8-18	7 7/8	7 7/8	-1/4	-3.0
N	PLANNING RESEARCH	11-17	12 3/4	12 3/4	+1/2	+4.2	O	BRESNAN COMP.	2-3	3 1/2	3 1/2	0	0.0
O	PROGRAMMING METHODS	22-24	21 3/4	21 3/4	-1/4	-1.5	S	COMISO INC	3-11	10 1/2	10 1/2	+1/4	+2.4
O	PROGRAMMING & SYS	1-2	1 1/4	1 1/4	+1/4	+12.5	O	COMPUTER EXCHANGE	2-3	3 1/2	3 1/2	+5/8	+21.8
O	SCIENTIFIC COMPUTERS	4-8	2 7/8	2 7/8	+1/8	+4.5	A	COMPUTER INVESTS GRP	8-14	9 1/8	9 1/8	-1/4	-2.4
O	SIMPLICITY COMPUTER	1-5	3 7/8	3 7/8	0	0.0	N	COMPUS	8-13	6 5/8	6 5/8	+1/8	+1.0
O	SOFTWARE SYSTEMS	1-3	1 3/8	1 3/8	0	0.0	N	DATAPOINT RENTAL	5-4	4	4	0	0.0
O	YES COMPUTER CENTERS	4-6	7 1/8	7 1/8	-1/8	-0.9	A	OCL INC	5-10	5 3/8	5 3/8	-1/2	-8.5
O	TRACOR COMPUTING	2-3	1 7/8	1 7/8	-1/8	-6.2	A	O'NEILL-ROTH	18-26	21	21	+3/4	+17.7
O	TYMSHARE INC	10-20	9 1/8	9 1/8	+3/8	+4.3	A	INC. - I	5-8	6	6	+1/8	+2.0
O	UNITED DATA CENTER	5-8	7	7	0	0.0	A	GRANITE MOT	7-11	7 7/8	7 7/8	-5/8	-8.0
N	UNIVERSITY COMPUTERS	1-2	20	20	+3/8	+1.8	A	INDUOMO COMPUTER	7-11	7 7/8	7 7/8	+1/2	+1.7
A	US SYSTEMS	6-10	20 3/8	20 3/8	+3/8	+1.8	N	LEASCO CORP	18-24	19 1/4	19 1/4	+3/8	+1.9
O	VORTEX CORP	4-5	2 1/2	2 1/2	0	0.0	N	LECTRO MOT INC	2-4	1 1/2	1 1/2	-2	-26.0
PERIPHERALS & SUBSYSTEMS													
N	ADDRESSOGRAPH-MULTI	34-44	41 1/8	41 1/8	-1/8	-0.5	O	NCC INDUSTRIES	8-11	8 3/4	8 3/4	+3/8	+4.8
O	ALPHAMER INC	1-2	3/8	3/8	-1/8	-25.0	A	ROCKWOOD COMPUTER	4-7	13 3/4	13 3/4	-1/8	-1.2
N	AMPEX CORP	7-9	7 1/8	7 1/8	-1/8	-1.1	O	SYSTEMS CAPITAL	4-7	13 3/4	13 3/4	-1/8	-1.2
O	ANDERSON JACOBSON	5-8	5 1/8	5 1/8	-1/8	-1.5	N	U.S. LEASING	4-7	13 3/4	13 3/4	-1/8	-1.2
O	ATLANTIC TELECOM	5-11	9	9	+1/4	+2.8							
N	BELL & HOWELL	9-14	15 1/8	15 1/8	+1/4	+1.6							
N	BUNKER-RAND	9-14	11 3/4	11 3/4	+1/8	+1.0							
A	CALCOMP	17-25	17 1/2	17 1/2	-1/8	-1.1							
O	CENTRONICS DATA CORP	11-13	11 3/2	11 3/2	-1	-7.6							
O	COGNITRONICS	3-5	3 1/8	3 1/8	-1/4	-7.6							
O	COMPUTER COMMUN.	3-5	3 1/8	3 1/8	-1/4	-7.6							
O	COMPUTER EQUIPMENT	4-5	3 1/8	3 1/8	-1/4	-7.6							
O	COMPUTER MACHINERY	7-13	9 7/8	9 7/8	-1/8	-1.0							
O	COMPUSET	5-9	5 1/4	5 1/4	-1/8	-1.8							
O	CONSOL COMPUTER LTD.	1-1	3/8	3/8	0	0.0							
A	DATA PRODUCTS CORP	5-7	4 5/8	4 5/8	-1/4	-5.2							
O	DATA RECOVERY INC	5-7	4 5/8	4 5/8	-1/4	-5.2							
O	DATA TECHNOLOGY	3-5	3 1/8	3 1/8	-1/4	-7.6							
O	DIJAM CONTROLS	0-8	6 1/8	6 1/8	-1/4	-5.2							
O	DIGITRONICS	5-8	5 7/8	5 7/8	+1/4	+1.5							
N	ELECTRONIC H & M	5-8	5 7/8	5 7/8	+1/8	+1.2							
O	FARRI-TEK	2-5	5 1/8	5 1/8	+1/8	+1.5							
O	GENERAL COMPUTER SYS	5-8	11 1/2	11 1/2	-1/2	-4.3							
N	GENERAL ELECTRIC	59-70	68 5/8	68 5/8	0	0.0							
O	HAZELTINE CORP	28-47	41 1/2	41 1/2	+1	+2.4							
O	INFOTEC INC	3-5	2 1/2	2 1/2	0	0.0							
O	INFORMATION DISPLAYS	3-5	2 1/2	2 1/2	0	0.0							
O	MANAGEMENT ASSIST	3-5	2 1/2	2 1/2	0	0.0							
N	MEMOREX	27-38	28 5/8	28 5/8	-5/8	-2.1							
O	NILOD ELECTRONICS	17-24	38 1/2	38 1/2	-1/4	-0.6							
O	NORAN DATA SCI	20-27	21 1/8	21 1/8	-1/8	-0.5							
O	OPTICAL SCANNING	7-16	12	12	0	0.0							
O	PERTEC CORP	7-15	12 5/8	12 5/8	-1/8	-0.5							
O	PHOTON	14-21	15 1/2	15 1/2	-3/4	-4.6							
O	POTTER INSTRUMENT	7-15	9	9	0	0.0							
O	PRECISION INST.	7-15	9	9	0	0.0							
O	RECONSTRUCTION EQUIP	8-15	8 1/2	8 1/2	-3/4	-8.8							
N	SANDERS ASSOCIATES	14-21	14 5/8	14 5/8	-1/4	-1.5							
O	SCAN DATA	15-21	21 5/8	21 5/8	-1/4	-0.5							
O	STORAGE TECHNOLOGY	17-39	37 1/2	37 1/2	+1/2	+1.0							
O	SYCOR INC	8-15	13 1/2	13 1/2	-1/2	-3.8							
O	TALLY CORP.	8-15	13 1/2	13 1/2	+1/2	+12.1							
N	TEXTRONIX INC	34-57	55	55	+2	+3.7							
N	TELEX	9-15	9 1/4	9 1/4	-3/4	-7.5							
SUPPLIES & ACCESSORIES													
O	BALTIMORE BUS FORMS	6-9	9 1/2	9 1/2	-1/4	-3.7							
O	BARRY WRIGHT	17-25	21 5/8	21 5/8	-1/4	-0.5							
A	DATA DOCUMENTS	17-26	21 5/8	21 5/8	-1/8	-0.5							
A	COMPLEX PRODUCTS INC	8-16	16 1/4	16 1/4	-1/4	-1.0							
N	ENRIS BUS. FORMS	7-10	10 1/8	10 1/8	+3/8	+4.2							
O	ENRIS MAGNETICS	7-10	10 1/8	10 1/8	+3/8	+4.2							
O	GRAPHIC CONTROLS	12-15	13 1/4	13 1/4	+3/4	+5.4							
N	3M COMPANY	120-158	154	154	+4	+2.6							
O	MOORE BUS. FORMS	42-55	55 1/2	55 1/2	+3/4	+1.1							
N	MUSHA CORP	16-18	18 1/2	18 1/2	-1/2	-2.1							
Computer Stocks Trading Index													
----- Computer Systems ----- Software & EDP Services													
----- Peripherals & Subsystems ----- Leasing Companies													
----- Supplies & Accessories ----- CW Composite Index													
125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0													
3 10 17 24 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141 148 155 162 169 176 183 190 197 204 211 218 225 232 239 246 253 260 267 274 281 288 295 302 309 316 323 330 337 344 351 358 365 372 379 386 393 400 407 414 421 428 435 442 449 456 463 470 477 484 491 498 505 512 519 526 533 540 547 554 561 568 575 582 589 596 603 610 617 624 631 638 645 652 659 666 673 680 687 694 701 708 715 722 729 736 743 750 757 764 771 778 785 792 800 807 814 821 828 835 842 849 856 863 870 877 884 891 898 905 912 919 926 933 940 947 954 961 968 975 982 989 996 1003 1010 1017 1024 1031 1038 1045 1052 1059 1066 1073 1080 1087 1094 1101 1108 1115 1122 1129 1136 1143 1150 1157 1164 1171 1178 1185 1192 1199 1206 1213 1220 1227 1234 1241 1248 1255 1262 1269 1276 1283 1290 1297 1304 1311 1318 1325 1332 1339 1346 1353 1360 1367 1374 1381 1388 1395 1402 1409 1416 1423 1430 1437 1444 1451 1458 1465 1472 1479 1486 1493 1500 1507 1514 1521 1528 1535 1542 1549 1556 1563 1570 1577 1584 1591 1598 1605 1612 1619 1626 1633 1640 1647 1654 1661 1668 1675 1682 1689 1696 1703 1710 1717 1724 1731 1738 1745 1752 1759 1766 1773 1780 1787 1794 1801 1808 1815 1822 1829 1836 1843 1850 1857 1864 1871 1878 1885 1892 1899 1906 1913 1920 1927 1934 1941 1948 1955 1962 1969 1976 1983 1990 1997 2004 2011 2018 2025 2032 2039 2046 2053 2060 2067 2074 2081 2088 2095 2102 2109 2116 2123 2130 2137 2144 2151 2158 2165 2172 2179 2186 2193 2200 2207 2214 2221 2228 2235 2242 2249 2256 2263 2270 2277 2284 2291 2298 2305 2312 2319 2326 2333 2340 2347 2354 2361 2368 2375 2382 2389 2396 2403 2410 2417 2424 2431 2438 2445 2452 2459 2466 2473 2480 2487 2494 2501 2508 2515 2522 2529 2536 2543 2550 2557 2564 2571 2578 2585 2592 2599 2606 2613 2620 2627 2634 2641 2648 2655 2662 2669 2676 2683 2690 2697 2704 2711 2718 2725 2732 2739 2746 2753 2760 2767 2774 2781 2788 2795 2802 2809 2816 2823 2830 2837 2844 2851 2858 2865 2872 2879 2886 2893 2900 2907 2914 2921 2928 2935 2942 2949 2956 2963 2970 2977 2984 2991 2998 3005 3012 3019 3026 3033 3040 3047 3054 3061 3068 3075 3082 3089 3096 3103 3110 3117 3124 3131 3138 3145 3152 3159 3166 3173 3180 3187 3194 3201 3208 3215 3222 3229 3236 3243 3250 3257 3264 3271 3278 3285 3292 3299 3306 3313 3320 3327 3334 3341 3348 3355 3362 3369 3376 3383 3390 3397 3404 3411 3418 3425 3432 3439 3446 3453 3460 3467 3474 3481 3488 3495 3502 3509 3516 3523 3530 3537 3544 3551 3558 3565 3572 3579 3586 3593 3600 3607 3614 3621 3628 3635 3642 3649 3656 3663 3670 3677 3684 3691 3698 3705 3712 3719 3726 3733 3740 3747 3754 3761 3768 3775 3782 3789 3796 3803 3810 3817 3824 3831 3838 3845 3852 3859 3866 3873 3880 3887 3894 3901 3908 3915 3922 3929 3936 3943 3950 3957 3964 3971 3978 3985 3992 4000 4007 4014 4021 4028 4035 4042 4049 4056 4063 4070 4077 4084 4091 4098 4105 4112 4119 4126 4133 4140 4147 4154 4161 4168 4175 4182 4189 4196 4203 4210 4217 4224 4231 4238 4245													

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of data processing media. They can store them in virtually any combination you desire, and — when your storage requirements change, optimedia cabinets can adapt to the changes. They're sort of a "living" storage system that won't become obsolete or leave you with excess capacity for one medium and not enough for another.

optimedia™ coordinated cabinets have other benefits such as "Action Level" storage that lets you place all media at the most convenient retrieval height, smooth operating roll up doors that open all the way leaving the entire inside fully accessible, and up to 20% extra storage capacity when compared to other cabinets with the same outside dimensions.

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